THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

So much has been done in iron and steel for 1902 that heavy buying movements are no longer to be expected. There is still enough business ahead to make the changes in prices that may yet come a matter of moment to many consumers, but on the bulk of their wants consumers know what their cost will be, and whatever advances may come the middleman rather than the mills will be the gainer. The pig iron situation still has the quieter aspect that has distinguished March from February. A meeting of several of the Southern producers was held at New York last week, and it was agreed that there should be no advance from the schedule price of $12 for No. 2 foundry iron. As a matter of fact little iron is being sold at this figure. In Eastern markets, where most consumers seem not to have covered as completely as those in Central and Western territory, there is a considerable demand and both Northern and Southern furnaces with iron to offer for the next six months are getting prices equivalent to an Alabama basis of $14 for No. 2 foundry. We hear of a 15,000-ton sale at this figure. In Central Western markets Northern sellers of foundry iron and some Southern sellers are getting considerable premiums for iron for second and third quarter delivery, while $17.50 at Northern furnace is now the usual basis for deliveries of No. 2 foundry in the latter part of the year. Basic and forge irons have been in demand. Virginia basic has been taken in considerable lots. Gray forge has sold at $18, Pittsburg, and this advance, as well as the advance in scrap, which has become more difficult to get, has led to a higher level for bar iron, 1.80c, Pittsburg, being maintained by one important producer, while another is still selling at 1.70c. The recent advance in steel bars to 1.60c, which will apply to large lots after April 1, may be accompanied, it is intimated, by an advance to 1.65c or 1.70c, Pittsburg, on ordinary lots. The heavy buying of bars in the past three weeks and the large tonnage under negotiation, to be closed before April 1, seems to have modified to some extent the conservative purpose of large interests and the market is creeping up in a way that has not been counted on. Bolt and nut manufacturers and chain manufacturers, following the lead of the bar trade, have advanced their prices in the past week. Structural material, which represents that sensitive barometer, the building trade, is guarded carefully by the pool managers, and there is no intimation of an advance beyond that made in the East. Western business is still being booked, a 15,000-ton contract for Chicago going to Pittsburg in the week. The mills have practically nothing to offer now for 1902, and may soon be called on to say what shall be the basis for 1903 on projects already seeking estimates. Some relief in the railroad situation has appeared with the favorable weather of the past 10 days, and mills are moving some of their accumulated product, while furnaces feel a trifle more secure as to coke, though still not any too confident. The steel problem is still present. Certain independent sheet interests have insured a supply of sheet bars after May 1 by the purchase of a Portsmouth, O., open-hearth plant, the capacity of which will be increased ultimately to 500 tons a day. A sale of billets at $31, Pittsburg, has been made for the second half. Foreign sheet bars are quoted at $33.50, Pittsburg, and foreign billets $32. The interest in foreign steel is less on this high basis. The program of extensions at steel corporation plants is taking shape. A large outlay will be made in increased capacity and in extensive improvements for the National Tube Co., with a view to making its position more commanding.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, March 26.

Interest locally is centered in the early announcement that will be made by the United States Steel Corporation of improvements and additions to be made to its properties. Fully $30,000,000 will be expended, and of this amount the National Tube Co. will receive $10,000,000 for extensions to its plants. The steel producing capacity of the Bessemer plant at Wheeling, W. Va., is not to be increased, however, nor are any additions to be made in that vicinity. The finishing capacity will probably be greatly increased to provide sufficient tonnage for the constantly increasing demand for the National Tube Co.'s products. Improvements at Homestead in additions to the armor plate plant, new angle mill, etc., will call for an expenditure of several million dollars, while additions to the properties of the other constituent companies will call for the remainder of the appropriation.

To provide additional steel capacity for their finishing mills the Laughlin Nail Co. and the Whitaker Iron Co., of Wheeling, W. Va., together with A. F. Baumgarten, of the Maryland Sheet & Steel Co., have purchased the Burgess plant of the Crucible Steel Co. of America, at Portsmouth, O., not including the crucible department. The plant is equipped with four 30-ton open-hearth furnaces and two additional furnaces are to be erected to increase the output to about 500 tons per day. Preparations are already being made and operations will be commenced about May 1. A portion of the steel output will be offered to the other independent sheet manufacturers who have been handicappd for some time on account of the lack of raw material. As stated last week the association has given up the idea of importing steel from abroad, Commissioner Bonnell not having been able to secure material at the prices determined.

At a meeting of the Southern pig iron producers held in New York last week for the purpose of considering the present situation the proposition of advancing prices came up for discussion. Nearly all the Southern furnaces are out of the market for the first half of the year, and very few are offering iron for delivery the second half. It was stated after the meeting that it was decided to continue the quotation of $12 for No. 2 foundry, Birmingham, but most of the furnaces having iron for delivery after July are holding out for $14, Birmingham, and we have been advised of a sale of 15,000 tons at this price. There has been considerable buying of Northern forge iron for second half delivery during the week, no less than 25,000 tons having been sold to various interests at prices ranging from $17 to $17.25 at the furnace. For delivery the remainder of the first half $17.75 at the furnace is asked.

There are indications of further advances in both iron and steel bars, and since last Saturday certain Western bari ron producers have been holding their product at 1.80c, Pittsburg, the same as the price established by the Eastern manufacturers. It

has been reported that there may be a still further advance in steel bars on April 1 to 1.70c instead of 1.60c as already decided upon. Meetings of the sales agents and purchasing agents of the constituent companies of the United States Steel Corporation were held in New York last week. The sales agents discussed many propositions pertaining to the treatment of the trade and the continuation of present prices and the outlined policy of the United States Steel Corporation is to be continued with reference to holding prices down to a moderate level.

Structural material still continues to be in great demand and German shapes are now being freely offered in this country for reasonably early delivery at $41 to $42 per ton. It is altogether probable, despite the difference between the American and German section that shapes will be imported. Among the large contracts closed during the week was one awarded the Carnegie Steel Co. for the structural work on a large office building in Chicago which will require about 15,000 tons of material.

Nut and bolt manufacturers have made advances of 10 cents per hundred on square and 20 cents per hundred on hexagon nuts, 20 cents on washers and a 5 per cent advance on machine and carriage bolts. The chain manufacturers at a meeting held here last week advanced the prices of chain from $3 to $4 per ton. Meetings of the cut and wire nail manufacturers will be held on Thursday, March 27, and it is probable that slight advances will be made on account of recent advances in raw material.

PIG IRON.—The buying of foundry iron for both immediate and future delivery continues in a very limited way, and the market continues very quiet. We note the sale of 3,000 tons of No. 2 foundry for delivery the second half of the year at $18.75, Pittsburg, while small lots for immediate delivery are being sold at $19, Pittsburg. The buying of forge iron for second half delivery has been particularly heavy during the past week, fully 25,000 tons having been sold. Prices ranged from $17.75 to $18, Pittsburg. There is little buying of Bessemer iron, small lots for prompt shipment being sold at $17.50 at the furnace. There is practically no Bessemer being sold at present for delivery the fourth quarter, the United States Steel Corporation not yet having placed its order. High grade charcoal and special irons have been sold ahead into 1903 throughout the first half of the year, but the tonnage amounts to less than 5,000 tons. We revise quotations as follows:

Bessemer, Valley	$17 00 to	17 50
Bessemer, Pittsburg	17 75 to	18 25
No. 1 Foundry	18 00 to	19 25
No. 2 Foundry	17 50 to	18 50
No. 3 Foundry	17 25 to	18 00
Gray Forge, Pittsburg	17 50 to	18 00
Chilled Basic, Valley	17 00 to	17 50
Chilled Basic, Pittsburg	17 75 to	18 25

STEEL.—The resumption of operations at the steel plant of the Crucible Steel Co. of America, at Portsmouth, O., which was sold during the week will to a certain extent provide raw material for the independent sheet producers who have had considerable difficulty in securing steel for their mills. Operations will be commenced about May 1 and the daily output will average about 300 tons. We note small sales of billets for delivery in the second quarter at $32 per ton, Pittsburg, and a sale of 500 tons for delivery the second half at $31. Foreign sheet bars continue to be held at about $33.50 and billets at $32. The demand for foreign steel is falling off considerably. Bessemer rods are quoted at $36 at mill.

SPELTER.—The spelter market is somewhat stronger and we quote prime western grades at 4.20c to 4.25c, Pittsburg.

FERRO-MANGANESE.—We continue to quote domestic 80 per cent at $52.50 per ton, delivered buyer's mill. Foreign manganese is held at $50 per ton.

MUCK BAR.—Muck iron continues to advance in price and we note the sale of 1,000 tons at $33.50 per ton at mill.

SKELP.—Both iron and steel skelp are strong and slightly higher in price. Sheared iron skelp is quoted at 2.10c and grooved at 2.05c; steel skelp at 2c to 2.05c.

RAILS AND TRACK MATERIAL.—The Canadian Pacific railroad has placed an order with German steel mills for 20,000 tons of rails for delivery this year. We revise quotations as follows: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 8 pounds, $45; 12 pounds, $42; 16 pounds, $39; 20 pounds, $37; 20 pounds, $35; 20 to 40 pounds, $33. Track material: Spikes, 2c to 2.05c; track bolts, square heads, 2.50c; hexagon heads, 2.65c; fish plates, 1.60c.

PLATES.—The tonnage in plates continues to grow better every week, and the plate mills are in good condition so far as future tonnage is concerned. Quotations are unchanged as follows: Tank plate, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches wide, 5 cents extra 100 pounds. Plates 3.16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash in 30 days.

PIPES AND TUBES.—The tonnage now being offered in merchant pipe and casing is much larger than ever at this season of the year. We quote the following discounts to jobbers in carload lots, Pittsburg:

MERCHANT PIPE.

	Blk. Per cent.	Galvd. Per cent.
⅛ to ¾ and 11 to 12 inches	60	48
¾ to 12 inches	67	55

Discounts below are to consumers in carload lots, Pittsburg:

BOILER TUBES.

Steel.

	Per cent.
1 to 1¾ inches	47½
2¼ to 5 inches	65½
1¾ to 2¼ and 6 to 13 inches	60

Iron.

	Per cent.
1 to 1¾ and 2½ inches	43½
1¾ to 2¼ inches	43
2¾ to 13 inches	53

CASING.

	S. and S. Per cent.
2 to 3 inches	58
3¼ to 4 inches	63
4¼ to 12½ inches	65

BARS.—Iron bars have been established on a basis of 1.80c by the Western manufacturers. This price was unofficially established by the Eastern producers about a week ago. It is also rumored that the price of steel bars will be advanced to 1.70c on April 1 on all lots instead of 1.60c as is now contemplated. We make the following quotations: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer under three inches, 1.70c; over 3 inches, 1.80c. The Western iron bar manufacturers are holding their product at 1.80c, Pittsburg, with full freight added to point of delivery. Hoops and bands are quoted at 1.90c, full extras; refined iron bars, 2c and upwards.

SHEETS.—A good demand continues for the heavier gauges of black sheets and the prices of the lighter gauges continues unchanged. A large amount of business is being offered both the independent producers and the American Sheet Steel Co. We make the following quotations: Nos. 10 and 12, 2.40c to 2.50c; 14 and 15, 2.50c to 2.60c; 16, 2.60c; 18 and 20, 2.70c to 2.80c; 22 and 24, 2.80c to 2.90c; 26, 2.90c to 3c; 27, 3c to 3.10c; 28, 3.10 to 3.20c; 29, 3.25c to 3.35c; 30, 3.35c to 3.45c. Galvanized sheets are quoted at 70, 10 and 5 off in carload lots; less than carload lots, 70 and 10 off.

STRUCTURAL MATERIAL.—During the week the Carnegie Steel Co. was awarded a contract for the erection of a large building at Chicago, which will require fully 15,000 tons of material in its erection. German structural material is now being freely offered in this country at $41 to $42 per ton, Pittsburg. Agreed quotations continue unchanged as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 6 inches, 1.60c; universal mill plates, 1.60c.

WIRE AND WIRE NAILS.—A meeting of the cut nail manufacturers and the wire and wire nail interests will be held on Thursday. An advance in prices is anticipated. The output of wire and wire nail mills continues unprecedented and demand is strong. Quotations remain as follows: Wire nails in carload lots, $2.05 per keg; smaller lots, $2.10 and $2.15; plain wire, $2 in carload lots and $2.10 in less than carload lots to retailers; galvanized wire $2.40 in carload lots; polished staples $2.20 and galvanized staples $2.60; painted barb wire $2.60 and galvanized $2.90. These prices are quoted on a Pittsburg base, plus the actual freight to destination. Cut nails are held at $2

in carload lots and $2.05 in less than carload lots, Pittsburg, plus freight to destination.

MERCHANT STEEL.—At a meeting of the chain manufacturers held in this city last week the price of coil chain was advanced about $3 per ton while bright chain was advanced about 5 per cent. Nuts were advanced 10 and 20 cents per 100 pounds for square and hexagon respectively, and an advance of 5 per cent was made in carriage and machine bolts. We revise quotations on nuts as follows: Hot pressed, Mfrs. U. S. or nar. gauge Standard—square blank, $5 and $5.20; hexagon blank, $5.30 and $5.50; square tapped, $4.80 and $5, and hexagon tapped, $510 and $5.30. Cold punched, Mfrs. or U. S. standard, square plain, $4.70 and $4.90; hexagon plain, $4.90 and $5.10; square C. T. & R., $4.90 and $5.10, and hexagon C. T. & R., $5.30 and $5.50. Carriage bolts, 60, 10 and 5, and 60 and 10; machine bolts, 65, 10 and 2½ and 65 and 7½. Turned, cold rolled and ground shafting in carload lots is quoted 50 off, and in less than carload lots, 45 off; tire steel, 1.70c in carload lots and 1.80c less than carload lots; toe calk, 2.10c to 2.25c; sleigh shoe, 2c to 2.25c; machinery steel, 1.50c; smooth machinery steel, 1.75c. Tool steel, 7 cents and upwards.

OLD MATERIAL.—The old material market continues strong and we revise our quotations, gross tons as follows: Heavy wrought scrap, $21 to $21.50; cast scrap, $17 to $17.50; iron rails, $25 to $25.50; car wheels, $19; cast borings, $9.50 to $10; wrought turnings, $13.50; steel rails, $19.25; steel rails for rerolling purposes, $24.

COKE.—The Connellsville *Courier* states that the output of the Connellsville region for the week ending Saturday, March 15, amounted to 215,067 tons, a slight gain over the production of the previous week. Shipments for the week aggregated 10,658 cars. For second half delivery Connellsville furnace coke is quoted at $2.50 and foundry at $3 to $3.25; outside cokes, at 25 cents less per ton.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
934 MONADNOCK BLOCK, March 25.

There are no indications of any easing of the stringency in the local market. The demand for both pig iron and finished product for early shipment exceeds the supply, and the question now with buyers is largely one of getting material irrespective of the price to be paid for it. All the furnaces have withdrawn from the market for the present, though not all of them have sold their entire capacity for the year. Some are even experiencing difficulty in filling the orders that were taken several months ago, on which shipments are beginning to fall due, and these concerns have been compelled to buy iron from whatever source they could get it to keep up with their engagements. The demand for spot iron shows no diminution, though it is practically impossible to get any at any price. The question of the future supply of pig iron for this territory rests largely with the coke shippers. At the present time only one-quarter of the amount needed is being received, and nearly all of this is coming from West Virginia. Should an improvement in the shipments come, as has been promised and expected so long, and the furnaces are able to keep continuously in operation, not only will there be plenty of iron to supply all needs, but manufacturers believe that the present abnormally high prices for quick shipment will disappear. With the lake season opening in a few weeks, however, shippers are not very hopeful of a great betterment in present railroad conditions. There has been heavy buying in the past week of merchant steel and bars by implement manufacturers. It is understood that a large portion of the tonnage on steel bars taken from these sources, has been sold on the basis of 1.65c Chicago, though mills assert that no concessions from the 1.75c rate will be made on either large or small orders after April 1st. The price of pipe has advanced 5 per cent, and plates out of store $2 a ton. Sheets and other finished products also show slight advances in the past week. Scrap iron is very scarce and dealers have no trouble in getting the present high prices.

PIG IRON.—At a meeting of Southern furnacemen held in New York last week, it was decided not to make a formal advance in the price of pig iron beyond the present rate, which is $12 Birmingham for No. 2 foundry. Since, however, the Tennessee company is selling only in a small way for the last half and the Virginia and Sloss furnaces have temporarily withdrawn from the market, this determination to maintain the old schedule has no effect on the prices prevailing in this market at the present time, which are as quoted below. For first half delivery, when it can be obtained, prices are invariably $1 to $2 a ton above the basis named, and $13 and $14 sales have been made for the second half also. It was also decided at this meeting that Southern iron henceforth would be sold on the basis of 2,240 pounds to the ton, instead of 2,268 pounds, which allowed 28 pounds to the ton for sand. Transactions in the past week have not been many, for the reason that sellers have very little iron to offer. Such as have prefer to hold on to it for the time being. Several large orders have been in the market, but it is understood all the furnaces refused to bid on them. The new furnace of the Republic Iron & Steel Co., at Birmingham, Ala., is almost completed, and will be blown in within a week or ten days. The Minerva furnace at Milwaukee, which is owned by independent interests, is so near completion that orders for its product are now being taken. We have revised some of our quotations, which follow:

Lake Sup. Charcoal	$21 00	to $22 00	Southern Coke No. 4	$15 65	to $15 90
Local Coke Fdy. No. 1	19 00	to 19 50	Southern No. 1 Soft	17 65	to 18 15
Local Coke Fdy. No. 2	18 50	to 19 00	Southern No. 2 Soft	17 15	to 17 65
Local Coke Fdy. No. 3	17 50	to 18 00	Southern Gray Forge	15 65	to 15 9
Local Scotch Fdy. No. 1	19 00	to 19 50	Southern Silveries	17 65	to 18 15
Local Scotch Fdy. No. 2	18 50	to 19 00	Jackson Co. Silveries	19 00	to 19 60
Southern Coke No. 1	17 65	to 18 15	Ohio Strong Softeners	18 50	to 19 00
Southern Coke No. 2	17 15	to 17 65	Alabama Car Wheel	20 50	to 21 00
Southern Coke No. 3	16 65	to 17 15	Malleable Bessemer	19 00	to 19 50

BARS.—The buying of steel bars by implement manufacturers has continued very heavy in the past week, consumers contracting for their year's needs, commencing July 1. This is the most active branch of the iron and steel trade, which is probably due to the fact that mills have announced that up to April 1, all orders above 500 tons will be taken on the basis of 1.65c Chicago. After this date, it is understood no concessions from 1.75c will be made to either large or small buyers. Bar iron is very srong, and some sales are reported at 1.95c. We quote iron 1.85c Chicago; steel 1.75c Chicago; out of store, 2.10c

SHEETS.—There is a fair volume of business. Prices out of store are firm, and on small orders have been advanced. It is reported that independent mills are experiencing some trouble in making shipments, owing to the difficulty in getting raw material. We quote No. 27 black from store 3.45c to 3.50c, and galvanized, 70 per cent to 70 and 2½ per cent.

STRUCTURAL STEEL.—Notwithstanding that material is hard to obtain, several buildings are reported as going up. From the large number of inquiries received by jobbers, it is presumed that contractors expect to get the material from these sources, though the rapidity with which these stocks are diminishing does not promise well for the date of completion of these structures. We quote mill shipments, carload lots, as follows: Beams, 15 inches and under, 1.75c; 18 inches and over, 1.85c; angles, 6x6 and under, 1.75c; over 6x6, 1.85c; plates, 1.75c; base, tees, 1.80c; zees, 1.75c; lots from store, angles, 2.50c, minimum; tees, 2.55c, minimum; beams and channels, 2.50c per pound, minimum.

RAILS AND TRACK SUPPLIES.—Further inquiries are reported for steel rails of standard sections, for such delivery as mills can make. Track supplies and light rails are in good demand, but owing to the crowded condition of mills, delivery cannot be promised within six months. We quote as follows: Standard rails, $28; light sections, $36 to $38, according to size; out of store, $40 to $44; splice bars, 1.80c to 1.90c; spikes, 2.30c; track bolts and hexagon nuts, 2.90c to 3.90c; out of store, 3.10c; square nuts, base, 2.75c to 2.85c; out of store, 2.95c.

BILLETS.—We hear of no large sales for billets, but carload lots have been sold at $38 a ton for Bessemer, and $40 a ton for open-hearth.

MERCHANT STEEL.—The heavy buying movement on the part of implement manufacturers for their season's supply continues, and mills have booked a large tonnage in the past week. We quote mill shipments, Chicago delivery, as follows: Smooth finished tire steel, 1.95c to 2c; open-hearth spring steel, 2.45c to 2.60c; sleigh shoe, 1.65c to 1.80c, flat sizes; concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.40c to 2.60c; machinery steel, 2.15c to 2.25c, base; plow steel 2.50c and upwards, according to quality; toe calk, 2.25c to 2.35c; out of stock, 2.40c to 2.60c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots, 5 per cent to 10 per cent higher; cold rolled shafting, carload lots, 50 per cent off, Chicago; less than carload lots, 45 per cent off, Chicago.

PLATES.—Jobbers have advanced prices $2 a ton. Mills report a good demand and that specifications on contracts are growing larger. We quote as follows, Chicago delivery: Tank steel, base, ¼-inch, 1.75c to 1.85c; flange steel, 1.90c to 2c; marine steel, 1.95c to 2.10c; fire box steel, ordinary, 2c to 2.10c; special, 2.25c and upward. Jobbers are selling from store according to size as follows: Tank steel, 2c to 2.10c; flange steel, 2.20c to 2.35c.

CAST IRON PIPE.—Business improves with the approach of spring, and judging from the volume of orders coming in, manufacturers anticipate a busy season. Prices are very firm as follows: 4-inch water pipe, $29, carload lots, f. o. b. Chicago; 6-inch water pipe, $28; 8-inch and larger sizes, $27; gas pipe, $1 per ton higher than above prices.

MERCHANT PIPE.—There has been an advance of about 5 per cent in both black and galvanized pipe. Sellers state that the buying in the past week has been exceptionally good; in fact, the tonnage sold is greater for this period of the year than for many years past. We quote as follows:

MERCHANT PIPE, RANDOM LENGTHS.

	Black Per cent.	Galv. Per cent.
⅛ to ⅜ in.	56½	44½
¼ to 12 in.	63½	51½

BOILER TUBES.

	Steel Per cent.	Iron Per Cent.
1 to 1¼ in.	40	35
1¼ to 2¼ in.	47½	37½
2¼ to 5 in.	57¼	47½
6 in. and larger	45	40

WIRE AND WIRE NAILS.—Manufacturers report a heavy demand for all kinds of wire products, and that mills are taxed to the utmost to keep up with same. Delivery on new business cannot now be had inside of three months. We quote as follows: Smooth wire, carload lots, $2.15; painted barb wire, $2.75; galvanized barb wire, in carload lots, $3.05; wire nails, carload lots, $2.20; staples, carload lots, $2.30; jobbers' prices to retailers, 10 cents higher than above for carload lots, and 20 cents for less than carloads.

COKE.—Practically the only coke that is being received in this market is from West Virginia, and this is not of a very high grade. Both furnaces and foundrymen are unable to tell from one day to another whether they will be working the next day, and have to depend on daily receipts to keep in operation. Connellsville coke is so scarce that shippers are refusing to quote on it. West Virginia coke commands from $5.50 to $6 a ton.

OLD MATERIAL.—Scrap of all kinds is very scarce, and there is no difficulty in finding a buyer for what is offered. Prices are very firm, and it is safe to say further advances may be counted upon in the next few weeks. We quote as follows:

Old iron rails	$22 50 to $23 50	Relaying rails	27 00 to 28 00
Old steel rails, 5 ft. and up	23 00 to 23 50	Old wheels	$17 50 to $18 00
Old steel rails, mixed	16 00 to 17 00	Heavy melting steel	15 50 to 16 00
		Mixed country steel	11 00 to 11 50

The following are selling prices per net ton:

No. 1 R. R. wrought	$18 50 to $19 00	Steel Axles	$18 50 to $19 00
No. 2 R. R. wrought	16 00 to 16 50	Cast borings	7 00 to 7 50
Dealers' forge	14 00 to 15 00	Wrought turnings	12 50 to 13 00
No. 1 busheling	13 00 to 14 00	Iron axle turnings	13 50 to 14 00
No. 1 R. R. & mach. cst.	13 50 to 14 00	Steel axle turnings	12 50 to 13 00
Railway malleable	13 00 to 14 00	Stove plates	10 50 to 11 00
Country malleable	12 00 to 12 50	Old iron splice bars	18 50 to 19 00
Iron axles	22 00 to 22 50		

CLEVELAND

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING March 26.

The ore trade is without special feature. Rather more ore is on dock than was anticipated in estimates at the close of navigation last season. In lake freights nothing has been done in the week and the question which of the two rates thus far made from the head of the lake will dominate is yet to be settled. The dock managers and the longshoremen's union have been deadlocked this week in their efforts to agree on wages and hours. The men asked for a reduction in hours from 12 to 10 and an advance for the tonnage men from 13 cents to 14 cents. The dock companies offered 13 cents and 11 hours which was refused.

PIG IRON.—Premiums continue to be paid for pig iron by consumers who did not take on an adequate supply for second quarter at the prices of three months ago. No. 2 foundry for prompt delivery has sold as high as $18.50 and $19 at Valley furnace. For delivery in the second half of the year there is some selling at $16.50 in the Valley, but only in a limited way by the few furnaces that are still trying to hold things down. The usual price for third and fourth quarters is $17.50 at furnace. Southern Ohio furnaces are now quoting on this basis. It has been a quiet week. The bulk of the buying for the latter part of the year seems to have been done, and on inquiries for near delivery sellers are for the most part unable to quote. We hear of some small lots of Bessemer iron sold at $17 to $17.50 at furnace. Forge iron cannot be had below $17 at furnace for early delivery, and is scarce at that. Basic is being sought for the latter part of the year, and there have been some sales. In one instance a steel works offered 20,000 tons, which was promptly taken up. For the fourth quarter it is understood that $17 at furnace is the producer's figure. Some Virginia basic has been sold in the week for Central Western consumption. We quote the Cleveland market as follows:

Bessemer	$17 75 to $18 25	Scotch No. 1	$17 75 to $19 25
No. 1 Strong F'dry	17 75 to 19 25	Scotch No. 2	17 25 to 18 75
No. 2 Strong F'dry	17 25 to 18 75	Gray forge, Valley	17 00 to 17 25
No. 3 Foundry	17 00 to 18 00	LakeSuperior charc'l	21 00 to 22 00

FINISHED MATERIAL.—Bars are still the feature of the market. Tonnage closed the past week and other tonnage under negotiation in the Cleveland market that is likely to be closed before the end of the month would reach a total between 40,000 and 50,000 tons. One producer of bar iron has advanced the base price to 1.80c, Pittsburg; but 1.70c is still quoted in other quarters on large lots. The advance in steel in large quantities to 1.60c, Pittsburg. April 1 it is thought may carry with it an advance on small lots to 1.70c. Thus far no advance in bar iron out of stock has been announced, but dealers state that 2c is likely to be the Cleveland basis April 1. Plates have been in fair demand and mills, while able to make fairly prompt delivery, are better supplied with orders than at any time in months. One Western Pennsylvania interest has bought plates for a connected steel car plant, the tonnage of its plate mill being limited. We continue to quote 1.70c, Cleveland, for tank. The structural mills have reached the point at which business for 1903 is about all that can be considered. Meantime some structural works are running very close to the point of embarrassment, from failure to receive material in just the assortment which the work in hand calls for. The sheet trade is moving without friction and there is no disposition on the part of independent mills to go below the quotations of the largest producers. We quote as follows on ordinary lots to consumers for Cleveland deliveries: No. 24, 2.90c to 3c; No. 26, 3c to 3.10c; No. 27, 3.10c to 3.20c, with extras for less than carload lots, etc. Store quotations range as follows, quantity and delivery determining the exact price: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.55c to 2.70c; No. 16, 2.95c to 3.10c; No. 18, 3c to 3.15c; No. 20, 3.05c to 3.20c; Nos. 22-24, 3.15c to 3.30c; Nos. 25-26, 3.25c to 3.40c; No 27, 3.35c to 3.50c; No. 28, 3.45c to 3.60c. The above are for one pass through cold rolls. For full cold rolled the extra is .10c. Galvanized sheets are quoted 70 to 70 and 5 off list. The wrought pipe trade shows the beginning of seasonable activity. The 5 per cent advance on merchant pipe last week, following a 3 per cent advance of some weeks ago, is in line with advancing raw materials.

OLD MATERIAL.—Prices continue firm in all lines and an extended list of material is given below in order that the general condition and strength may be seen. Sales in small lots are frequent, indicating the scarcity of stock at yard and furnace with a disposition to cover present requirements only. The following prices are in gross tons for Cleveland delivery:

Old iron rails	$ 23 00 to 24 00
Old steel rails (6 ft. and over)	20 00 to 22 00
Old steel rails (6 ft. and under)	17 00 to 18 00
Old car wheels	16 00 to 18 00
No. 1 R. R. wrought scrap	21 00 to 22 00
Mill scrap	17 00 to 17 50
No. 1 machine cast scrap	15 00 to 16 00
Iron axles	26 00 to 28 00
Axle turnings	16 00 to 17 00
Wrought turnings (free from cast)	13 50 to 14 00
Cast borings	8 00 to 9 00
Uncut wrought iron boilers	11 00 to 12 00
Steel boiler plates	16 00 to 17 00
Grate bars	11 00 to 12 00
Pipes and flues (clean)	17 00 to 18 00
Tank iron	17 00 to 18 00
Hoop and band iron	13 00 to 14 00
Sheet iron	11 00 to 12 00
Wrought drillings	13 00 to 13 50
Malleable iron	17 00 to 18 00
Stove plate	12 50 to 13 50
Heavy steel	17 00 to 18 00

PHILADELPHIA.

March 25.

The market has nothing to show which would indicate a change in the immediate future. Customers continue to hope that improvement in transportation facilities will in some degree relieve the stringency now prevailing, though how far their wishes will be met is problematical. As far as prices are concerned there is no standard, every transaction being practically a law unto itself. With an increase in supplies the premiums now exacted for prompt deliveries will undoubtedly be shaded, but for the second quarter of the year there is but little expectation of any material change. In a general way it may be said that the country's industries were never more prosperous, it being much less of a question to secure new business than to find ways and means for handling it satisfactorily.

PIG IRON.—While the makers are generally opposed to further advances, the fact remains that it is those who have iron for sale who control the situation as far as the present is concerned. There is sufficient demand for iron for early delivery to warrant the paying of heavy premiums over standard quotations. The large producers are all heavily sold and but few will fix any positive date as to deliveries, simply agreeing to fill orders in the rotation in which they are received. As near as can be ascertained the following prices represent the range of quotations for Philadelphia and near-by points, covering deliveries up to July 1st: No. 1 X foundry, $19.50 to $20.50; No. 2 X foundry, $18.75 to $19.50; No. 2 plain, $18 to $18.50; standard gray forge, $17.50 to $18; ordinary gray forge, $16.75 to $17.25; Basic (chilled), $18 to $18.75. Where favorable conditions as to time of delivery can be offered by the buyer it is possible to shade these quotations from $1 to $2.

FINISHED MATERIAL.—The heavy demand continues and in structural material nothing seems available this side of midsummer, although from $5 to $10 are being offered above nominal quotations for such small amounts as can be secured to fill pressing needs. The plate mills having business booked to keep them agoing for months ahead are also turning down considerable business where the time for delivery is short. In bars prices seem to be working toward a higher level and there is great pressure for deliveries on old contracts. Where new business is being placed this is generally only accomplished by paying from five to ten cents per hundred pounds above nominal rates. For seaboard and city deliveries quotations are made as follows: Plates, ¼-inch and thicker, 1.80c to 1.90c; bars, iron or steel, 1.75c to 1.90c; angles, 1.75c to 1.85c; beams and channels, 1.75c to 1.85c.

OLD MATERIAL.—Prices have made further advances, but the market in general is very irregular and quotations depend a great deal upon the time at which deliveries are to be made. Sales have been made within the following range of values: Choice railroad scrap, $23 to $24; ordinary light scrap, $14 to $15; machinery cast, $16.50 to $17.50; heavy steel scrap, $20.50 to $22; old iron rails, $24 to $26, wrought turnings, $14.50 to $15; cast borings, $9 to $9.25; old iron axles, $26 to $27; old steel axles, $22.50 to $23; old car wheels, $17.50 to $18.

CINCINNATI.

March 26.

In all branches of the iron trade the tendency is upward rather than downward, with indications even that strong interests may not be able to hold it stationary. Pig iron is quoted at $12 Birmingham for No. 2 foundry, in spite of the fact that there has been no spot iron selling for any price to speak of and no iron for delivery inside of two or three months selling on that basis. The demand is good and some large buyers have been on the market. Southern interests are still apart on the question of what is the right quotation, although the heads of one large concern have made the positive statement that iron would advance either $2 or $3 above the nominal $12 basis. As a matter of fact it is about $2 above that figure now.

The market for finished material is firmer, although there is no change. The demand is very good and deliveries are slow. There is every indication that building operations will be far under what they would if structural material could be secured, but it now looks as though before the year is out there will be a great scarcity in some kinds of structural material. Machine tool men are having a good business and all classes of manufacturing industries that consume iron and steel in any shape report large business. Such lines as agricultural implement makers say that they see indications of a larger business than they had last year, especially if crop prospects continue good.

PIG IRON.—While prices at which iron for early delivery is selling have shown a marked tendency to advance, the minimum price remains unchanged, and although there are practically no sales at $12 Birmingham this price is still the agreed upon basis. A meeting in New York, which was well advertised, was held last week and it was thought that there would be an advance of $2 per ton. In fact officers of one of the largest Southern companies stated before the meeting that an advance would positively be made. This was not done, however, and an attempt to quote prices on Southern iron has still to take as the minimum $12 Birmingham for No. 2.

A good demand has appeared for Bessemer, basic and gray forge. One buyer was in the market last week for a large block of Bessemer deliveries throughout the year. Another concern has been negotiating for 30,000 tons of basic for delivery over 9 months. Sales have been generally made on the basis of $14 Birmingham for delivery any time after 4 or 5 months and up to the end of the year. Some contracts have been placed for delivery in 1903. It is a problem what the outcome will be in respect to the market. Prices at Cincinnati can be quoted as follows, allowance being made for quotations made by different interests:

Southern Fdy. No. 1	$15 25 to $16 50	Gray Forge	$13 75 to $15 00
" " 2	14 75 to 16 00	Northern Fdy. No. 1	17 25 to 18 75
" " 3	14 25 to 15 50	" " 2	17 35 to 18 25
" " 4	13 75 to 15 00	Southern C.W. iron	20 00 to 21 25
So. Fdy. No. 1 soft	15 25 to 16 50	Malleable coke iron	17 60 to 18 60
So Fdy. No. 2 soft	14 75 to 16 00		

FINISHED MATERIAL.—While no change has been made in prices, the demand has been so great that it would have caused an advance if the market were not in the hands of strong interests. All lines of consumers are buying generously. Agricultural implement makers are coming into the market freely and other lines are not far behind. It is expected that a meeting of the local iron store interests will be held some time during the week at which the store prices on bar iron and bar steel will be advanced above 2c, the prevailing price for some time. Prices remain the same as last week and are as follows: On bar iron, 1.82c; on steel bars, 1.72c. Angles remain at 2c; plates at 1.85c; sheets, No. 28, 3.35c to 3.40c; No. 12, blue annealed, 2.35c.

OLD MATERIAL.—Scrap iron remains firm with an advancing tendency, at the prices quoted last week. There is no material change, though the demand for rails is good enough to warrant railroads and dealers getting more rails into the market if they could. Prices are as follows:

Old No 1. Wrought Railroad, net tons	$ 17 00 to 17 50
Cast Machine and Foundry, net tons	12 75 to 13 25
Old Iron Rails, gross tons	21 50 to 22 00
Old Steel Rails, gross tons	18 00 to 18 25
Old Short Lengths, gross tons	15 25 to 15 50
Old Iron Axles, gross tons	21 50 to 22 00
Old Iron Car Wheels, gross tons	16 00 to 16 50
Stove Plates, gross tons	9 75 to 10 00
Wrought Turnings, net tons	11 75 to 12 00
Cast Borings, net tons	6 00 to 6 50

The second semi-annual dividend on the $5,000,000 of preferred stock of the Dominion Iron & Steel Co. is due April 1, but owing to the fact that the company has not earned the $175,000 necessary to pay this dividend, owing to the incompleteness of the Sydney plant, and as Canadian laws do not permit the payment of unearned dividends, the company has petitioned the Nova Scotia Legislature for permission to pay this dividend out of the proceeds of the sale of the new $10,000,000 stock. It is reported that the underwriting price of the new stock is to be 25. The steel rail mill needs $700,000 and this is the principal item in the program of rounding out the steel plant.

The Carnegie Sheet Co., of Pittsburg, has plans prepared for the erection of a six-mill sheet plant at Carnegie, Pa. The question of erecting an open-hearth plant consisting of two furances of 25 or 35 tons capacity is now being considered.

The Armstrong Bros. Tool Co., of Chicago, has recently appointed agencies in Australia and New Zealand, and has made arrangements with C. S. Christensen, of Christiania, Norway, with a view to his representing the interests of the company in Norway, Sweden and Denmark.

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INCREASING COST OF BASIC OPEN-HEARTH STEEL.

The appearance of the annual statistics of Bessemer steel production suggests again the relation of the Bessemer and open-hearth outputs in the United States at a time when the future of the basic open-hearth process is a matter of particular interest. The figures printed last week from the American Iron and Steel Association returns showed an unprecedented production of Bessemer ingots in 1901—a total of 8,713,302 gross tons, as against a record of 7,586,354 tons in 1899, and 6,684,770 tons in 1900. Last year's record, with practically no additions to our Bessemer capacity, beyond a few Tropenas vessels, since the Lorain, O., plant was finished, is an illustration of the splendid advance in steel works practice in the last few years. In new open-hearth development, on the other hand, there has been great activity, both for castings and rolled products. While Bessemer production fell off 900,000 tons in 1900 from that of 1899, open-hearth production advanced, in spite of the slump from the boom year, and reached the total of 3,398,135 tons in 1900, as against 2,947,316 tons in 1899. If there should prove to have been only a like gain of 450,000 tons in 1901 over 1900, in open-hearth steel—and the probability is that this is below the actual—the total of our steel production for 1901 would be 12,560,000 tons—nearly 2,000,000 tons more than in the boom year 1899, and nearly three times the total of 4,277,071 tons so recently as 1890. This is an amazing advance.

Some time ago, in commenting on the expansion of the open-hearth steel industry, we referred to the indications that this would follow two lines simultaneously —the building of plants of large units and the use of direct metal by the leading steel producers, and on the other hand the erection of small plants by independent producers requiring a moderate supply of steel for finishing plant, heretofore depending on large steel companies for their raw material. It has long been common to speak of the basic open-hearth process as the recourse of the smaller producer, in view of the absorption of important steel plants in consolidations. The abundance of cheap scrap and the small unit of plant that needs to be laid down, as compared with the Bessemer—which is essentially a tool of large producers—are the considerations generally urged. Indeed, it has been said that where basic open-hearth steel is produced on a considerable scale the difference in cost between it and Bessemer is practically negligible, the cost of Bessemer ores as compared with those utilized in making basic pig, or with much of the scrap that in the "scavenger" basic furnaces was boiled into the best of mild steel, offsetting the large tonnage of three or four blows an hour.

It was overlooked in the gradual increase in open-hearth steel production up to a few years ago, that as the production of steel containing a considerable percentage of scrap increased, cheap scrap would cease to be a factor. Today the scarcity of scrap for steel-making is one of the most prominent factors in the situation. Imported melting scrap is called for as at no other time. At the same time the price of basic pig has arisen to a level with that of Bessemer. Merchant furnacemen having experience in the production of both find that there is now little difference between the cost of Bessemer iron and that of chilled basic. The more expensive ores in the one are offset in the other by the increased fuel and slag, the lower yield of iron, the greater wear of furnace. Furthermore, the requirements of buyers of basic iron call for lower phosphorus than formerly—often a limit of 0.40, as against 0.75—making the choice of ores somewhat narrower than heretofore. A correspondent of the *Iron Age* says of the pig iron and scrap phases of the problem as now emphasized:

> The two prominent features of the situation are that the basic open-hearth furnaces must rely chiefly upon basic pig at Bessemer prices for their material, and that the iron rolling mills which are in the pig iron districts must promptly provide themselves with puddling furnaces, and rely upon pig iron instead of scrap for the manufacture of iron bars. The supply of scrap, supposed to be almost limitless, has proven to be ludicrously insufficient to provide for those two great interests in their present development; and the present necessity of the mills and furnaces is to provide themselves with material which can be purchased in quantity and in unfailing supply. The scanty and irregular production of scrap will not answer the requirements of large establishments, and the risk of stoppage for want of material cannot be incurred.
>
> Evidently, it is no longer wise to erect open-hearth plants with the expectation of running them on scrap; and the projectors of such plants should squarely face the fact that their work must, for the most part, be done with basic pig iron; and, similarly, the makers of merchant iron bars must provide themselves with puddling furnaces, in so far as their locations shall enable them to utilize forge pig iron in the place of scrap.

It would appear that the manufacturer of basic open-hearth steel must ground himself in a pig iron supply, and, back of that, in an ore supply, or in a long time contract with the merchant ore producer. Or it may be that the merchant furnacemen, who are growing fewer both in the foundry and steel-making pig iron trades, will become the natural allies of the detached finishing mills. Under conditions like today's, however, the prospect of such an alliance seems quite remote. The important consideration in the whole matter is that as the open-hearth steel industry must be based more and more on ore, the availability and value of comparatively neglected deposits becomes a question of new interest. That the United States Steel Cor-

poration has early appreciated this situation has been shown in recent months in the acquisition of Lake Superior properties heretofore passed by.

Another factor in the problem is that with the increase in the cost of open-hearth steel to a permanently higher level than that of Bessemer steel, the advantage will be increasingly with the larger plants. Those able to take direct metal to a mixer and to handle it in large masses, as in the Monell or the Talbot process, will have a considerable advantage, when the days of small margins come again, over those charging cold pig iron into furnaces of small output.

PROPHECY AND FACT IN PIG IRON CONSUMPTION.

The violent swings of the pendulum in iron and steel production have been the despair of trade prophets. Yet much depends on the time range of the prediction. Attention has been called many times to the remarkable closeness of the Hon. Abram S. Hewitt's prophecy of 1856 to the actual pig iron production of the world in 1875. His figure was 14,000,000 tons; the statisticians 20 years later found that the production for 1875 was within a few thousand tons of this. In 1890 Mr. Hewitt predicted, on the basis of the observed arithmetical ratio of increase over a period of years, that the United States would produce in 1900 a total of 15,750,000 tons of pig iron and that in the same year the world's production would be 35,000,000 tons. The actual production for the United States fell below Mr. Hewitt's prediction, being 13,789,242, or nearly 2,000,000 tons less, while the world's production, estimated by James M. Swank to have been 40,400,000 gross tons, went more than 5,000,000 tons beyond the prediction.

It is worthy of note, however, that Mr. Hewitt's prediction for the United States was very close to the actual production for the year 1891, or one year later, and that Edward Atkinson, who also made a prophecy for 1900, was very close to the actual world's consumption for that year. In 1901 our production of pig iron was 15,878,354 gross tons, or 128,000 tons more than Mr. Hewitt's prediction for 1900, made 11 years before. Mr. Atkinson predicted consumption rather than production—though for the entire world these will be no great distance apart for a given year—and his figure of 40,000,000 tons for the world's consumption in 1900 was within 400,000 tons or 1 per cent of Mr. Swank's estimate, which was largely based on official statistics. Mr. Atkinson, by methods similar to Mr. Hewitt's, arrived at a consumption of pig iron in the United States in 1900 of 15,500,000 tons. Though in 1895, in view of the panic with ensuing prostration beyond anything the country had ever seen, Mr. Atkinson published an article modifying his prediction for 1900, the outcome showed that there was a good basis for his computation. But for the mistakes of the boom of 1899 there would no doubt have been in 1900 such a year of iron and steel consumption as was the year following. Mr. Atkinson based his estimate of consumption in 1900 on a population of 80,000,000 and a per capita consumption of 400 pounds of iron. Our approximate actual consumption of pig iron in 1901 exceeded this considerably. Adding to the production of 15,878,354 tons the decrease in stocks in the year, 371,723 tons, and the imports of pig iron, 62,930 tons, and subtracting the exports, 81,178 tons, the apparent consumption was 16,231,829 gross tons. This divided by 76,000,000 gives a per capita consumption of 478.5 pounds. Between 1877 and 1889 our per capita consumption increased from 150 to 300 pounds a year. In the 12 years following 1899 the per capita increase was 60 per cent instead of 100 per cent. In the same period the increase of population was from 64,000,000 to upwards of 76,000,000 or about 20 per cent. A like ratio of gain in population and in per capita consumption in the 12 years following 1901 would give a pig iron consumption in the United States in 1913 of 30,000,000 tons.

Open Competition on Rolling Mill Equipment.

(Special Telegram.)

PITTSBURG, March 26.—Foundries that have been parties to the five-year agreements with the American Tin Plate Co. and the American Sheet Steel Co. respectively, have notified the trade in the past few days that they are again in position to take orders for sheet mill and tin plate machinery. As predicted in these columns several weeks ago the agreements have been dissolved by mutual consent. Ten foundries were parties to the tin plate agreement and 14 to the sheet agreement. New tin plate and sheet mill work that has been proposed is now being sought by all the foundries formerly parties to agreements and the competition for this work is especially keen.

An English Record for a Basic Open-Hearth Furnace.

Bolckow, Vaughn & Co. during the week ended Feb. 1 obtained from one of their steel furnaces at Cleveland Works the remarkable output of 563.45 tons of ingots, notwithstanding that the furnace has been in continuous operation since June 21, and the coal consumed was only 0.31 ton per ton of steel produced. The material consisted of 50 per cent pig iron and 50 per cent scrap, and all of it was charged cold by hand. It is considered that this constitutes a European record for a basic lined furnace.—[London Iron and Coal Trades Review.

In the recent hearing at New York of the suit of John H. Parks against John W. Gates for an accounting of profits made in connection with the organization of the American Steel & Wire Co. Judge E. H. Gary told of the preliminaries of the deal in the latter part of 1897. "The first thing we did was to obtain an option on the plant of the American Wire Company in Cleveland. The option was obtained from President Thomas of the Erie Railroad Co., in the name of Mr. Gates. The price was $600,000, which we considered very reasonable. I also had negotiations with Mr. Odell, now governor, for the acquisition of a steel and wire plant in Newburg of which he was receiver." The blowing up of the Maine on Feb. 15, 1898, defeated the plan for the time being, bankers who had been interested writing soon after that occurrence that they would go no further. After the original negotiations failed the matter was taken up anew, and the result was the American Steel & Wire Co., of Illinois, a $24,000,000 corporation.

The output of pig iron in Germany in 1901 was 7,785,887 tons, against 8,422,842 tons in 1900, a decrease of about 7½ per cent. The output of steel, however, was only 3.7 per cent less, being 6,394,222 tons, as against 6,645,869 tons in 1900. Last year's output was made up of 4,274,886 tons of Bessemer ingots, 2,021,126 tons of open-hearth ingots, and 107,210 tons of steel castings. During the month of January of this year the output of pig iron in Germany was 656,688 tons, against 641,545 tons in December, 1901, and 695,212 tons in January, 1901. The figures thus show an increase of 15,143 tons over December, 1901. Stocks are still very high, and were not less than 305,000 tons in January in the Rhenish and Westphalian districts.

Benjamin Atha & Co., Newark, N. J., have just added a new department for the production of small machine molded steel castings weighing from 10 to 250 pounds each. The Newark plant now includes four foundries. In the large foundry castings as heavy as 50,000 pounds are produced.

INDEPENDENT SHEET MILLS BUY A STEEL PLANT.

B. L. Hirschfield, attorney, of Pittsburg, closed a deal last week for the purchase of the Burgess plant of the Crucible Steel Co. of America, at Portsmouth, O., on behalf of the Whitaker Iron Co., Laughlin Nail Co., of Wheeling, W. Va., and A. F. Baumgarten of the Maryland Sheet & Steel Co., of Cumberland, Md. The plant has been inoperative for some time, and it was the intention of the owners to dismantle it some time ago. Repairs will be made immediately and every effort will be made to place the plant in operation by May 1. It has already been decided to add two additional open-hearth furnaces which will increase the daily open-hearth steel output to nearly 500 tons. The board of trade at Portsmouth paid the purchasers $20,000 for repairs to be made immediately. The plant was formerly operated by the Burgess Steel & Iron Works and was entirely rebuilt in 1899, following the fire of June, 1898. The plant contains 9 gas heating furnaces, 2 annealing furnaces, 1 pair furnace, 6 trains of rolls, one 8, one 12, two 18-inch, one 20x48-inch, and one 24x65-inch, and one 4-ton hammer, four 30-ton Swindell open-hearth steel furnaces, two acid and two basic. Owing to the scarcity of small billets and sheet bars the output of the plant will be limited to this product for some time after operations have been resumed.

Proposed Nickel Consolidation.

The name of Charles M. Schwab and of the United States Steel Corporation have been connected in the past week with the acquisition of control of 50 per cent of American and British nickel producing interests. It has been denied, apparently on authority, that the United States Steel Corporation as such is interested, but it is believed Mr. Schwab is connected with the new consolidation. It is stated that Col. Robert M. Thompson, of the Orford Copper Co., of New Jersey, and his associates have acquired a controlling interest in the Canadian Copper Co., and also an amount of stock in the Nickel Corporation of London, sufficient to give them an important voice in the affairs of that concern. These three companies control about 50 per cent of the nickel production of the world. The Orford Copper Co. produces no nickel, its business being that of smelting. It operates a large smelter at Bayonne, N. J., and for many years now it has been refining the nickel produced by the Canadian Copper Co. A considerable percentage of the production of the Nickel Corporation of London also is brought over here to be refined at the Bayonne works. The three companies, indeed, have been working in close harmony for quite a long time. The plans now forming contemplate a still closer affiliation. This end probably will be achieved through the agency of a holding company.

It is denied that the Nickel Co., of Paris, which is the largest single producer of nickel, has been acquired. The use of nickel alloy in the production of armor plate makes natural the identification with the new corporation of a representative of the Bethlehem and Homestead plants.

The Strunk-Meyer Lime Co., Cold Springs, O., with offices also at Cincinnati and Springfield, announces that the estate of Simon H. Strunk has purchased the interest of Herbert H. Moores in the firm of Moores & Co. and has become associated with John A. Meyer in the manufacture and sale of wood-burned Peerless Springfield lime. The daily capacity of the plant is 10 cars. The firm sells its dolomite to open-hearth steel manufacturers as a substitute for magnesite. The analysis shows 54.08 per cent carbonate of lime, 45.69 per cent carbonate of magnesia, 0.29 per cent of alumina and sesquioxide of iron and 0.31 per cent of silicious matter.

Wm. Edwards, of San Francisco, engaged in the manufacture of forgings on the Pacific Coast, has been in Pittsburg the past week in connection with plans for the enlargement of his works. A small steel casting plant may also be installed.

Shipments to date of ore from the Cuban Steel Ore Co.'s mines aggregate 29,508 tons. All the ore has been taken by the Pennsylvania Steel Co. (Maryland Steel Co.) which controls the Cuban Steel Ore Co. The average price received for the ore has been about $2 a ton f. o. b.

AMERICAN STANDARD SPECIFICATIONS FOR STEEL.

In a cloth bound 16-mo of 103 pages Albert Ladd Colby, of South Bethlehem, Pa., has made a useful contribution to the literature of steel specifications, under the title "Review and Text of the American Standard Specifications for Steel." In his introduction Mr. Colby, who is a member of Committee No. 1 of the American Section of the International Association for Testing Materials, reviews the efforts made in the United States to standardize specifications for steel starting with the work of the Association of American Steel Manufacturers which first published its standard specifications in August, 1895, and revised them in 1896. Then came the organization of the American Section of the International Association for Testing Materials. It was organized in 1898 and has done a vast amount of important work. It finally framed 10 proposed American standard specifications and these were duly endorsed by the American Section. At the congress of the International Association for Testing Materials held at Buda-Pesth in September, 1901, these were presented along with the specifications of the German and French branches of Committee No. 1. A resolution was adopted at the same time calling on the chairman of International Committee No. 1 to report at the next congress, which will be held in St. Petersburg in 1903, on the expediency of adopting international specifications, and if possible to prepare a set of proposed international specifications for iron and steel.

In the book before us Mr. Colby has condensed and rewritten the review of the work of the American Committee which he presented at the International Congress on Testing Materials of Construction, at Paris in 1900, and has given also the revised text of the American standard specifications. He says of these specifications that "they will serve for the majority of uses to which steel is applied and can be modified to suit particular requirements without departing materially from the standard form and practice recommended."

While not in every detail a finality these specifications of the American Section Committee No. 1 represent the painstaking work of the best engineering authorities, and this publication by Mr. Colby should be an aid to their general adoption at home and their increasing recognition abroad. This latter consummation would be of vast help to our export trade. The book is sent postpaid at $1.10.

National Association of Manufacturers at Indianapolis.

Announcement is made by President Theodore C. Search that the seventh annual convention of the National Association of Manufacturers will be held in Indianapolis, April 15, 16 and 17. Local arrangements for the convention are being made by a committee of Indianapolis business men under the leadership of D. M. Parry, who has been for many years a member of the executive committee of the association. Members of the association are manifesting more than usual interest in this year's convention and there is promise of a large attendance from all parts of the country.

President Search announced at Detroit last year, when he consented to accept the presidency for the sixth time that he could not serve the Association in that capacity beyond the expiration of the present year. He has recently made known his adherence to this determination, and one of the problems which the Indianapolis convention will have to consider will be the selection of a new president. As yet there is nothing to indicate upon whom the choice of the Association will fall. During the six years of Mr. Search's presidency the membership of the Association has increased from less than 200 to more than a thousand, and a vast amount of hard work has been done to promote the interests of the manufacturers of the United States.

The National Association of Manufacturers was organized in Cincinnati in 1895, and its annual conventions have been held in Chicago, Philadelphia, New York, Cincinnati, Boston and Detroit.

The Toledo Machine & Tool Co., Toledo, O., is completing a shipment of twelve carloads of punch presses for the equipment of a large manufacturing plant in England. The company reports a heavy demand for machinery and expects a large business during the coming year.

PERSONAL.

W. H. Crawford, who has been superintendent of the Trussville Furnace of the Lacy-Buek Iron Co. at Trussville, Ala., has resigned and has accepted a position as manager of the Hillman Land & Iron Co. at Grand River, Ky.

At a meeting of the stockholders of the Woodward Iron Co., of Birmingham, Ala., held last week the number of directors was increased from five to seven, George B. McCormick and A. H. Woodward being elected to complete the board.

Officers of the Alabama Consolidated Coal & Iron Co., of Birmingham, Ala., made a tour of inspection of the company's properties in the vicinity of Gadsden last week. The party included the following gentlemen: D. H. Gordon, J. W. Middendorf, R. H. Edmonds, J. Levering, S. Baldwin, W. G. Seddon, C. T. Westcott and T. Roland.

J. L. Brass, manager of the Virginia Iron, Coal & Coke Co., Bristol, Va., has tendered his resignation to take effect on April 1. W. R. Wills has resigned as treasurer of the same company and will be succeeded by John W. Core at present traveling auditor of the company.

The board of directors of the Alabama Steel & Wire Co., Birmingham, Ala., has been increased from three to five by the election of Courtland Van Camp, president of the Van Camp Hardware & Iron Co., of Indianapolis, and John Bindley, president of the Bindley Hardware Co., of Pittsburg.

D. Davies, auditor of the Virginia Iron, Coal & Coke Co., of Bristol, Va., has been appointed to succeed B. L. Brass as manager. W. B. Bowles will succeed Mr. Davies as auditor.

H. S. Willard, Jr., has succeeded O. B. Gould as vice-president of the Wellston Iron & Steel Co., Wellston, O.

Frank H. Crockard has been appointed manager of the Wheeling and Benwood, W. Va., plants of the National Tube Co.

At the annual meeting of the Sloss-Sheffield Steel & Iron Co., held last week, the retiring board of directors was re-elected with the exception of F. W. Scott, of Richmond, Va., who was succeeded by Col. A. B. Andrews, first vice-president of the Southern Railway Co.

J. J. Shannon has resigned as superintendent of the Ensley furnaces of the Tennessee Coal, Iron & Railroad Co., Ensley, Ala.

Henry Shields, manager of the Girard Iron Co., Girard, O., has resigned to give attention to recently acquired lumber interests in the South.

F. R. Phillips, of Philadelphia, sailed this week for Europe where he will remain for some months during the execution of numerous iron and steel contracts placed abroad by F. R. Phillips & Sons Co. He takes with him a number of large buying orders and expects to place a heavy tonnage of steel for future delivery. Mr. Phillips also expects to close contracts on several propositions covering the installation of modern American labor saving machinery in British steel plants and rolling mills.

Joseph Panterow, general foreman of the blacksmith and other shops of the Westinghouse Electric & Mfg. Co., East Pittsburg, Pa., has been appointed to a similar position in the British Westinghouse plant at Manchester, Eng. The employes of the shops over which he had jurisdiction presented him with a handsome gold watch and chain.

W. T. Dwire has resigned the presidency of the Ellington Machine Co., at Quincy, Ill., and Thomas Hill, of the Quincy Engine Co., will serve in that capacity until the annual meeting.

The 1902 edition of "The Copper Handbook," compiled and published by Horace J. Stevens, Houghton, Mich., lists and describes 700 copper mines, including all mines of importance in the world. Originally devoted to the copper industry of the Lake Superior region the scope of this handbook has been widened to include all copper mines, though necessarily some are given but brief mention. There are in addition chapters on the history, chemistry, mineralogy and metallurgy of copper, and full statistics of the copper industry in all countries. The volume contains 416 pages and is sold at $2 in buckram binding, $3 in full morocco.

The Sharon, Pa., plant of the Republic Iron & Steel Co. will resume operations shortly after an idleness of several months, due to the inability to secure a sufficient supply of pig iron. The Hall furnace, which supplies iron for this plant, was relighted last week.

ENGLISH PIG IRON FOR THE UNITED STATES.

A Middlesbrough, Eng., market letter to the London *Iron and Coal Trades Review*, dated March 13, refers as follows to transactions in pig iron for export to the United States: "No further orders have this week been reported for Cleveland iron for the United States, though present prices will still allow of its being delivered at the foundries near the American seaboard at prices which are not in excess of the prices reported for American iron. The freights to the United States are very low at present, but, if any considerable trade has been done, makers must expect to have to pay higher freights. Altogether, something like 20,000 tons of Cleveland pig iron have been sold for delivery in the United States. This is satisfactory, but it is more satisfactory still to know that there is no likelihood of American competition this year either in this country or in neutral markets. More Canadian iron is being received in Scotland, but it is said that it has not been sold; it is simply sent 'on spec.' Some Scotch iron has been sold within the last few days to go to Canada. It is thus rather anomalous that while Canadian iron is coming to Scotland, Scotch iron should be sent to Canada. The Canadian makers seem desirous of establishing a market for their iron in Scotland, where it will come into competition with Cleveland iron."

Manchester correspondence of the same paper says: "There is still a possibility of the United States becoming a considerable buyer of English iron, which, in the first instance, gave a considerable stimulus to the upward move in prices, and both for raw and finished material, fairly large American inquiries continue to be reported on the market here."

"An American inquiry for 1,000 tons of hoops is just now on the market, but with the present cost of production it is doubtful whether this will lead to actual business. Last year, when Lancashire makers were in a more favorable condition for quoting low prices, a considerable American business was secured by the Lancashire hoop manufacturers, but they now assert that with the high price of material and fuel not likely to be materially cheaper, they are not in a position to quote, for American orders, prices which would be likely to result in similar transactions to those of last year."

A Berlin cablegram says that the United States Steel Corporation is buying iron in Germany and that 2,000 tons have just been taken on Pittsburg account.

In the United States Circuit Court at Pittsburg this week, John M. Hansen, defendant in the suit brought by the Pressed Steel Car Co., filed an affidavit denying all the statements made in the affidavit filed by F. N. Hoffstot, president of the Pressed Steel Car Co. The case grew out of the withdrawal of the Schoens from the Pressed Steel Car Co. and the establishment of the Standard Car Co. Hansen secured six valuable patents on his inventions, and it was to secure these that suit was brought, it being alleged that by the terms of his contract with the Pressed Steel Car Co. he was to turn over such patents and applications for patents to the plaintiff company. Hansen in his affidavit denies that he ever entered into a contract with the firm to assign any inventions or patents so that they would become the sole property of the plaintiff company. He asserts that all assignments made by him were voluntary and without consideration; that he was employed by Charles T. Schoen, then president of the company, and that no contract was then or afterward made regarding the assignment of any inventions or patents. When he was employed by the Pressed Steel Car Co. he had made no improvements and secured no patents, and hence there was no occasion for any such agreement. He alleges that his sole reason for making the assignments he did was his personal regard for C. T. Schoen, who had shown him great kindness. He denies that his salary was part consideration for the assignment mentioned. He denied all charges of conspiracy, and says that it is not the intention of the Standard Steel Car Co. to make cars in duplication of the cars of the plaintiff company, but that the cars of the Standard Steel Co. will not be pressed steel but structural steel. Other affidavits supporting Mr. Hansen were filed by C. T. Schoen, E. H. Schoen, Peter F. McCool and others.

Furnace No. 2 of the Columbus Iron & Steel Co., South Columbus, O., has been relighted after an extended idleness for repairs.

FOUNDRIES OF THE UNITED STATES AND CANADA.

Information carefully gathered by *The Foundry* and briefly referred to in these columns a short time ago, shows that there were in the United States at the opening of 1902 a total of 4,615 iron foundries, or a gain of over 11 per cent on the number shown by *The Foundry's* canvass two years before. From a detailed analysis of the figures which recently appeared in that journal we take the following, together with the diagrams which accompanied the article:

From information at our disposal we believe that at a very conservative estimate, the foundry capacity of the United States is today fully thirty per cent greater than it was two years ago. There is not the least doubt that extensions of existing plants have brought into use at least double the capacity of new plants. There is no way in which the actual amount of iron melted can be figured out with any degree of certainty. The foundries as a class are notoriously lax in keeping records of any kind, let alone reliable ones. The record of blast furnaces producing foundry irons would be a guide though it would fail to show to what extent the foundries have consumed scrap iron in various forms. If an average melting ratio could be obtained together with a record of the amount of coke used by foundries one would be in a fair position to obtain an approximate estimate of the total amount of iron melted. We do know, however, that it has at times been difficult to secure iron and coke and this in itself goes further towards proving that there are indeed real busy times in the foundries than any statistical figures we could quote.

We give herewith some graphic illustrations, showing how the foundries of the United States are distributed. The relative position of the leading states in iron founding is as it was two years ago, although Pennsylvania has made a dash which carries it exactly 200 foundries ahead of New York, its nearest rival; the difference two years ago being but 135. The average increase throughout the different states shows a remarkable uniformity. Eight states show an actual decrease in their number of iron foundries, due to the abandonment of poorly located enterprises. On the whole those who have been talking about the iron foundries losing ground will find but small comfort in these returns.

The five states of Pennsylvania, New York, Ohio, Illinois and Michigan contain 2,269 iron foundries, or nearly fifty per cent of the whole. Fourteen southern states, including Arkansas, Maryland, Texas and West Virginia, have in two years increased their number of iron foundries from 550 to 656, or a gain of nearly twenty per cent, although all of the shops found within this territory lack 65 of being equal to the number of foundries doing business in Pennsylvania.

In the number of brass foundries the state of New York leads with 133, Pennsylvania following with 121. Connecticut has the largest percentage of brass foundries, the manufacturers of this state having long been noted for their brass goods. It is interesting to note, however, that the city of Philadelphia lacks but one of equalling the number of brass foundries in Connecticut. The country at large has 875 foundries which melt brass exclusively.

In the malleable iron industry a gain of 12 is shown, the number of establishments engaged in this branch of the trade being 107. Illinois leads with 18, Pennsylvania 16, New York 15, Ohio 12, Wisconsin 11, Connecticut 10. The output of the latter state is small compared with the number of plants engaged. The six states named hold 76 per cent of the malleable trade. The south as yet has but one malleable plant, located at Chattanooga, Tenn. The malleable capacity of the country at large has been greatly increased through the enlargements of old plants.

In the list of steel foundries we have included several relatively small plants using the Tropenas process. That the demand for steel castings is increasing is shown in the gain of 41 per cent in the number of plants engaged in the trade. Pennsylvania again shows its remarkable hold upon the iron industry by claiming 29 shops or 40 per cent of the total capacity, Ohio ranking second with ten steel foundries and Illinois third with seven.

In the annual report of the American Iron and Steel Association for 1899, James M. Swank gives the total production of direct open-hearth steel castings in that year as amounting to 169,729 gross tons, against 120,587 tons in 1898. The same authority gives the production for 1900 as 177,491 gross tons, of which 42,644 tons were made by the basic process and 134,847 tons by the acid process. Of the total Pennsylvania produced 78,584 tons.

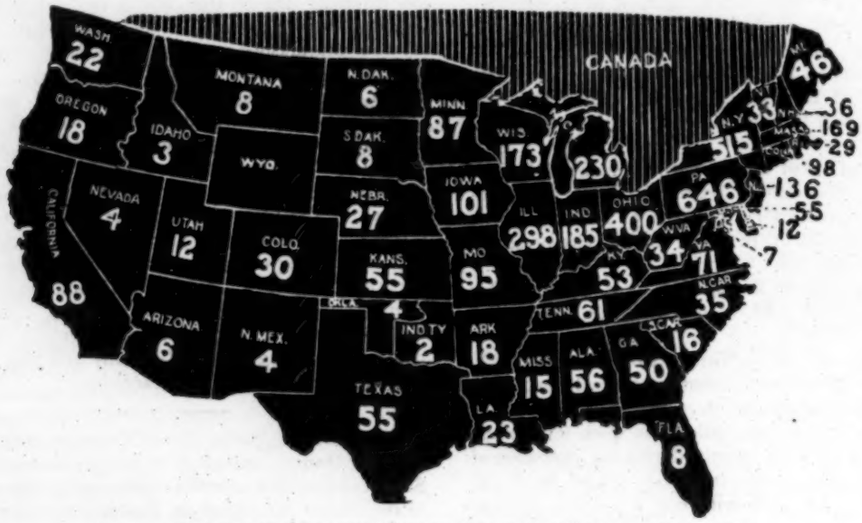


FIG. 1.—DISTRIBUTION OF FOUNDRIES IN THE UNITED STATES, JAN. 1, 1900.

The stove industry does not show as great a gain in numbers as other branches of the trade, but the output has been vastly increased through enlargements. Pennsylvania again leads with 44 shops, Ohio 39, New York 30, Illinois 25, Massachusetts 16, Indiana 14, Michigan and Tennessee each 13, Kentucky 12. These nine states control 206 out of 269 stove foundries, or 76 per cent of the whole. Of course in referring to the stove trade we have only taken notice of manufacturers who operated their own foundries. Makers of steel ranges, sheet iron stoves and other concerns who buy their castings are not included in the figures given.

The following thirty-three cities, representing the leading foundry centers in the United States and Canada, have twenty or more foundries each. Together they represent 23 per cent of the total:

City.	Iron Foundries.	Brass Foundries.
Philadelphia, Pa.	81	62
Chicago, Ill.	93	42
Cleveland, Ohio.	40	30
New York, N. Y.	21	48
Pittsburg, Pa.	50	16
Brooklyn, N. Y.	44	20
Cincinnati, Ohio	31	32
St. Louis, Mo.	36	26
Detroit, Mich.	34	22
Buffalo, N. Y.	37	18

Milwaukee, Wis.	40	11
Boston, Mass.	18	27
Baltimore, Md.	30	10
Newark, N. J.	21	18
San Francisco, Cal.	23	12
Indianapolis, Ind.	26	5
Columbus, Ohio	20	10
Montreal, P. Q.	22	7
Louisville, Ky.	24	3
Reading, Pa.	23	4
Providence, R. I.	16	11
Minneapolis, Minn.	20	6
Dayton, Ohio	20	5
Springfield, Ohio	22	2
Erie, Pa.	17	7
Birmingham, Ala.	18	4
Jersey City, N. J.	12	10
Toronto, Ont.	17	5
Worcester, Mass.	18	3
Rochester, N. Y.	16	5
Allegheny, Pa.	18	3
Denver, Colo.	17	3
Bridgeport, Conn.	7	13

Chicago yet maintains her position as the leading center of iron foundries in the world, although if all kinds of foundries are considered she must yield the first place to Philadelphia. Pittsburg holds third place in point of iron foundries; Brooklyn fourth, with Cleveland and Milwaukee tied for fifth place.

No one will deny that the Dominion of Canada makes a creditable showing with 527 foundries to her credit. Ontario is especially noteworthy for the extent of its foundry business, and the Province of Quebec, considering its location and resources, is holding its own. It is of course true that many of the foundries of Canada are small affairs, but the same will hold good throughout the United States.

FIG. 2.—DISTRIBUTION OF FOUNDRIES IN THE UNITED STATES, JAN. 1, 1902.

On the whole the small foundry is as yet very much in evidence, and it probably always will remain so. It is really a question if some of our large foundries are not too unwieldy to be handled to the best advantage. There are a lot of foundries in this country without railroad facilities, proper equipment, etc., which are making more money than some of the best modern shops, all of which goes to show that up-to-date equipment is not everything. Very often it appears as if insufficient attention is being paid to the personal element in the trade. The small shop, well located and looked after by a competent man is one of the most active competitors large foundries are forced to meet.

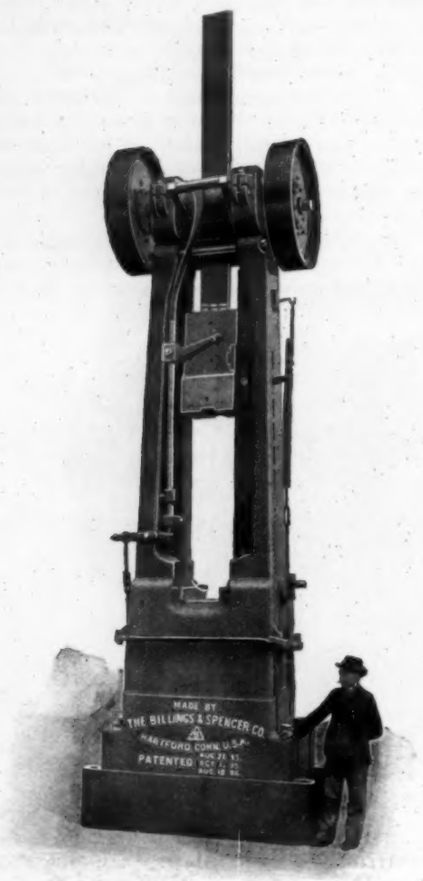
The foundry has not escaped the consolidation spirit of the times as the following corporations show: the Central Foundry Co., representing the soil pipe interests; the Southern Car & Foundry Co., operating a number of southern car building establishments; the United States Cast Iron Pipe & Foundry Co., controlling the greater part of the gas and water pipe trade; the Allis-Chalmers Co., comprising a number of the leading engine and mining machinery builders; the American Car & Foundry Co., representing the majority of northern car works; the American Radiator Co., composed of the largest radiator manufacturing concerns in the country; the American Steel Casting Co., which includes the pioneer steel casting works; the International Steam Pump Co., covering the largest makers of pumping machinery; the United Engineering & Foundry Co., composed of the leading builders of rolling mill machinery; the American Ingot Mold Co., which takes in the principal ingot mold foundries; the American Bridge Co., comprising the leading bridge works and erectors of structural material; the American Shipbuilding Co., covering the principal plants on the great lakes; the International Heater Co., a consolidation of New York heater manufacturers; the Magnus Metal Co., makers of car brasses and journal bearings; the Niles-Bement-Pond Co., builders of heavy machine tools; the Pittsburg Stove & Range Co., which took over a number of Pennsylvania stove foundries; Standard Sanitary Mfg. Co., makers of bath-tubs and sanitary appliances; American School Furniture Co., manufacturers of church and school furnishings; American Locomotive Co., builders of locomotives. The American Stove Co. has lately been formed to take over the majority of the makers of oil and gas stoves, and another concern of the same name is reported to have been incorporated under New Jersey laws for the purpose of consolidating a number of cast iron stove foundries, on which options have been secured. However, previous attempts to consolidate any considerable part of this branch of the trade have fallen through and it is as yet uncertain how much success will attend the present project.

James B. Clow & Sons, for many years located at Lake and Franklin sts., Chicago, are transferring their stock to their new building, at Franklin and Harrison sts. This structure is one of the most substantial and best equipped of the fine buildings recently erected in Chicago. It will be used for office, warehouse and manufacturing purposes. The Clow office force is nearly settled in the new quarters and machinery is now being purchased for the enlargement of the brass foundries, finishing and cabinet works of the sanitary manufacturing departments which will soon be located on the upper floors. Heaters will be manufactured in the basement where the pipe cutting and radiator assembling shops will be located, the radiators being manufactured at the Clow pipe foundries, at Newcomerstown, O. The assembling of plumbing fixtures will be done on the fifth floor, the offices and show rooms will be located on the second floor, and the remaining floors will be largely used for stock. This building has a saw-tooth roof, affording all northern light for the seventh floor foundries and shops. Every labor-saving device applicable to this business is being introduced in the sales and manufacturing departments. The shipping facilities are excellent, with thoroughfares on two sides of the building, the river on a third side and a special track running into the basement, connecting directly with all main lines of the South, Southeast and Southwest.

The differences between C. E. Robinson and E. T. and G. H. Schuler, of the Alabama Steel & Wire Co., have been settled by the purchase of the stock of Mr. Robinson by the Messrs. Schuler.

IMPROVED 3,000-POUND DROP HAMMER.

The greatly increased demand for very heavy forgings has necessitated the building of a machine specially adapted to the work. The 3,000-pound B. & S. drop hammer, since its installation in the plant at Hartford, has proved indispensable in the production of heavy forgings and in producing forgings requiring a large area of displacement. This hammer will do the work more speedily than is possible with a lighter hammer. Notwithstanding its great weight and size, the working parts are so nicely adjusted that there is no extra exertion necessary on the part of the operator in running it. The long experience of the Billings & Spencer Co. in the drop forging business, some thirty years, and their facilities for testing various suggestions for improvement in the practice have materially aided in the development of the machines now under construction. The company has demonstrated for example that increased



IMPROVED 3,000-LB. DROP HAMMER.

weight of the anvil or base gives increased efficiency to the machine. Given two drop hammers with the falling weight the same number of pounds and dropping the same distance and the anvil of one machine weighing twice as much as the other, the machine with the heavy anvil will do twice as much work in one blow as the machine with the light base. The company has therefore adopted from the results of such experiments the ratio of 15 to 1, the weight of the base being fifteen times the weight of the hammer proper. It is at the same time advocated that the hammer should be erected on solid concrete foundations as such foundations still further increase the efficiency of the machines by giving additional resistance to the blow. The 3,000-pound machine has the uprights and head construction 100 per cent heavier than formerly in order that they might better resist the crystallizing effects of the blows of the hammer. The castings are of the best charcoal iron and open-hearth steel. The hammer and die shoe are of hammered wrought iron or steel.

This line of drop hammers, of which the 3,000-pound machine is a type, is built by the Billings & Spencer Co., of Hartford, Conn.

ATLAS ENGINE WORKS EXPANSION.

The Atlas Engine Works, Indianapolis, Ind., has increased its capital stock from $550,000 to $2,000,000. The increase in the capitalization is to cover the cost of recent improvements and other large improvements now under contemplation. Of the new stock to be issued half will be common and the remainder preferred. Of the preferred $350,000 has been sold or exchanged for the purpose of retiring a like amount of preferred stock issued seven years ago, while $250,000 of the common stock is to be retained in the treasury. The common stock will not be offered for sale as it has all been subscribed for by the present stockholders. The Indiana Trust Co. has taken $650,000 of the preferred stock and will offer it to the public at 107½. This carries an annual cumulative dividend of 6 per cent. The profits of the company in the past few years have been enormous. In 1889 they amounted to $429,038.37; in 1900, $284,242.85, and last year to $254,293.76. The resources on Oct. 31, 1901, were $1,462,520.37. The readjustment of the finances of the company does not contemplate a change in the management. The officers are as follows: H. H. Hanna, president; Bement Lyman, treasurer; R. M. Coffin, secretary; H. H. Hanna, Jr., vice-president; M. R. Moore, superintendent and E. K. Marquis, assistant treasurer. During the last year the company has completed the following buildings: A boiler shop, 70x900 feet, with wing 60x365 feet and independent power house; forge shop No. 2, 50x205 feet; foundry, No. 2, 70x300 feet; foundry No. 3, 120x500 feet, and machine shop No. 4, 50x323 feet, three stories. Buildings now occupy practically all the room in the original tract of twenty acres, not already covered by buildings or railroad tracks. The company has purchased additional tracts of ground, comprising about twenty acres in all. On part of this ground it has under construction a central melting plant, where all the iron for its various foundries will be melted and carried to the foundries in ladle cars. Foundations are going in for a central power station, from which electrical transmission will carry power to all parts of the plant.

Iron Workers' Wage Questions.

The National Association of Blast Furnace Workers will serve notice on the blast furnace operators on April 1 that on May 1 they will insist on the eight-hour turn instead of 12-hour shifts. No official action has yet been taken by the blast furnace operators regarding this demand. It is not expected that a strike will be declared as a compromise will no doubt be effected.

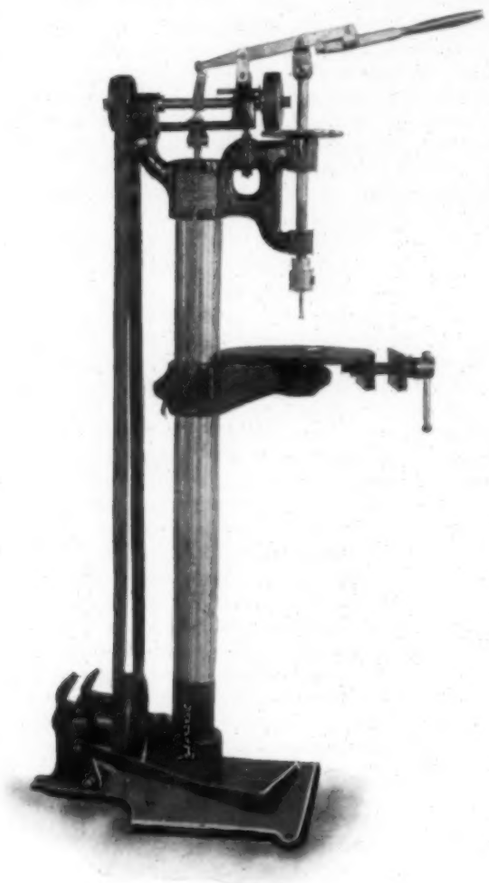
The National Association of Tube Workers of the United State and Canada was organized in Pittsburg last week. The new organization will be affiliated with the American Federation of Labor. Officers were elected as follows: Henry Sabel, president; J. L. Smith, treasurer; John B. McDonough, secretary, and William Holland, president of the Board of Trustees. The main strength of the organization lies among the tube mills in the eastern part of Pennsylvania, although several lodges have been organized among the tube workers in the plants of the National Tube Co.

The Philadelphia, Pa., members of the International Association of Bridge and Structural Iron Workers have placed themselves on record against the proposed compromise offered them by the American Bridge Co. to go into effect on May 1. The unions demand 50 cents per hour in the following cities: Chicago, New York, Pittsburg, Newark, Philadelphia, Cleveland, St. Louis and Wheeling; 40 cents per hour in Buffalo, Milwaukee, Omaha, Denver and Richmond; 40 cents per hour in Boston, Washington, Kansas City, Albany, Minneapolis, Scranton, Cincinnati, Salt Lake City, San Francisco, Portland, Indianapolis and all sections outside those described. In Baltimore and Detroit $3.50 per day of eight hours is demanded. There are differences about the employment of foreign labor and on the apprenticeship question. In both cases the union voted to stand by the International association's proposal and to reject the plan that would allow the employment of as many non-union foremen as desired and the instruction of one apprentice to every seven journeymen employed.

The Carroll-Porter Boiler & Tank Co., Wellsville, O., has received an order for 300 tank cars from the International Great Northern Railway of Texas.

A NEW SENSITIVE DRILL PRESS.

The sensitive drill press shown in the accompanying illustration was recently designed by the Rhoades Mfg. Co. of Columbus, O., and patents on its peculiar construction are now pending. The intention of the designers has evidently been directed to the arrangement of a drill press where the hand of the operator would be applied as directly as possible to the spindle and not through the medium of a rack and pinion feed or any similar arrangement. A lever, jointed so that it may be folded back out of the way when not in use, is attached to the end of the spindle and the weight of the rotating parts is taken by coil springs of the simplest form, the latter having a wide range compared with the variation in resistance. The steel spindle is ¾-inch in diameter and is driven by a neat frictional device. A light metal disc on the drill spindle is driven by a smaller and wider pulley which is mounted on the horizontal shaft at the top of the machine. Both the disc and the pulley are held by keys sliding in the splines so that the two shafts may easily move through the driving pieces of the mechanism. The lower disc is held in place by the downward



NEW SENSITIVE DRILL PRESS.

thrust of the driver and the latter is capable of being set at any distance from the center of the disc by a forked bracket fitting in a groove on the back of the driving portion of the frictional connection. This forked bracket may be seen immediately below the fulcrum of the lever and above the horizontal shaft driving the drill spindle, and by means of a set-screw the operator may readily change the position of the discs transmitting the motion. Thus the speed can be adjusted to the size of the drill and when it is desired to increase the size of the drill the speed may be lessened and thereby increase the turning force applied to the cutting edges. The same reasoning holds, of course, with the employment of a smaller drill and a higher speed.

The pressure of the two elements in the frictional drive is adjusted by a vertical screw and check-nuts on the upper right hand side of the column, the bracket with the shaft being attached by a hinge so the pressure of the driving surfaces can be nicely regulated. The column has an unusual feature in machine design and is at the same time strong, light and neat. It is made out of wrought tubing 3½ inches in diameter. The table is counterbalanced by a weight inside the column, may be moved up or down 24 inches, and is capable of rigid attachment at any desired point by a grip screw in the table support. A similar device is employed for locking the table in position. The table support rotates upon the column and the table itself can be turned on its axis in the usual way and is provided with a vise for holding the work, or holding a jig or rest at any angle, for drilling purposes. One jaw of the vise is cast solid on the table. The jaws are 5 inches wide and will open to a width of 2½ inches. The countershaft is attached to the base of the machine and the belt shifter is operated by a foot lever.

The machine stands 5 feet over all; floor space, 14x22 inches; swings clear of column, 12½ inches; diameter of table, 12 inches; countershaft has tight and loose pulleys; small pulleys 3¾ inches, 1½ inch face; large pulley 7 inches. Every machine is provided with a chuck that will take all sizes of drills from 1-64 to ⅜ inch. Weight of machine, 160 pounds.

EFFICIENCIES OF ELECTRIC CRANES.

At a meeting of the Manchester Association of Engineers, held on March 8 at Manchester, Eng., Mr. R. Matthews read a paper on "Efficiencies of Electric Cranes." A few years ago, he said, whilst negotiating for the purchase of a number of electrical cranes of various sizes, for Sir W. G. Armstrong, Whitworth & Co., Ltd., he was surprised to find the vagueness and lack of information thereon. It compelled him to decide on ascertaining, in a practical manner, the actual results of certain cranes with varying loads, as far as possible without incurring too much delay and expense. The first crane he referred to was a three-motor 70-ton crane, 50-ft. span, also having a 10-ton light lift. The motors were series-wound, and the electromotive force of the electrical installation was about 220 volts. On eight different loads, ranging from 1.45 to 80.85 tons, the average efficiency was 48.18 per cent. On eight total loads, ranging from 18 to 98.85 tons, the average tractive force in traversing was 43 lb. per ton, and on eight total loads from 48 to 128.85 tons, the average tractive force in traveling was 26 lb. The second crane he would refer to was a four-motor 50-ton crane, 30-ft. span, with a separate light lift motor, for a load of 5 tons. On six different loads of from 1.05 to 45.75 tons the average efficiency in hoisting was 45 per cent; and on six loads of from .06 to 5.3 tons, the average efficiency of the 5-ton light lift was 51.7 per cent. Another crane was a three-motor 50-ton crane, 75-ft. span, with a light lift arranged for 10 tons. The average efficiency, on six loads from 1.6 to 43.8 tons, was, in hoisting, 39 per cent; on total loads of 18.85 to 61.05, in traversing the average tractive force was 40 lb. per ton, and on total loads of 67.85 to 110.05, in traveling the average was 43.7 lb. per ton. A three-motor 30-ton crane, 50-ft. span, with a 5-ton light lift, gave an average of only 17.45 per cent efficiency in hoisting, on six loads of from .42 to 31 tons; in traversing, on seven total loads of 12.42 to 43 tons, the tractive force was 48.8 lb. per ton, and in traveling, on seven total loads of 34.42 to 64 tons, 29.1 lb. per ton.

In explanation of the low hoisting efficiencies, he noted that the motor was evidently too small for the work. A 5-ton crane, 40-ft. span, with girders and crab strong enough for 10 tons, hoisting six loads of from .06 to 5.32 tons, gave an average of 34.39 per cent efficiency; in traversing, on total loads from 2.56 to 7.82 tons, the tractive force averaged 75.6 lb. per ton; in traveling, on total loads of 10.56 to 15.82 tons, the average tractive force was 44.6 lb. per ton. An old rope crane, 40 tons capacity, and 45 ft. span, to which a shunt motor was attached, gave an average efficiency, in hoisting 10 loads of from 1.15 to 43.25 tons, of 11.33 per cent. Mr. Matthews then gave a table, showing the number of services, the time occupied, and the load dealt with during each operation, over a period of ten consecutive working days, which, he remarked, indicated that in a large heavy machine shop, principally consisting of heavy shafting, gun-boring and turning lathes, there was a great amount of time during which the cranes were idle, so that the element of first cost, *i. e.*, capital account, required due consideration.

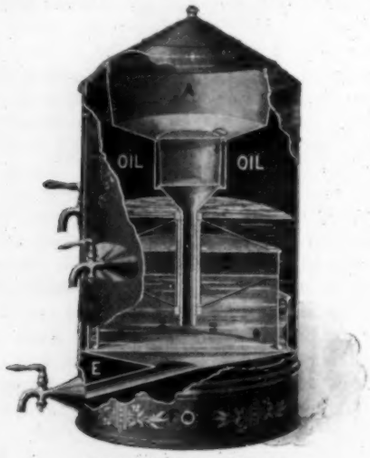
Mr. Matthews dealt with the relative annual cost of rope and electric cranes, which ranged 25 to 35 per cent in favor of the

former. In conclusion, he observed that while the object of his paper was to favor neither electric nor rope cranes, the results obtained with the cranes mentioned tended to convey to his mind that for serving machines of large size, principally engaged on long operations, cranes involving small capital outlay appeared to be advantageous, providing they were reliable. In the annual charges for electric and rope cranes, for the same operations, the good old reliable friend, the rope crane, showed up very much better than expected. No doubt the fact of the tools being engaged on oil-hardened material, necessitating long spells without interruption, was in its favor. For erecting, and light machine shop work, or where services were often and quickly wanted, the electric crane would be preferred.

ACME OIL FILTER.

The Acme oil filter is built of heavy galvanized iron and the filtering medium is animal boneblack or charcoal; materials recognized by the oil refiners as the best filtering agencies. The Nos. 1, 2, 3 and 4 sizes have steam connections, inducing greater and more effective filtering capacity.

In the accompanying cut A is the receptacle for the impure oil; the oil sinks through the central tube by gravity to again rise in the water and the filtering material (immersed in the water) and is then cleansed for removal and is drawn off from the faucets, as shown in the illustration. The filtering material and its location is designated by C; D is the pan for catching the dirt liberated for deposition when the oil comes in contact with the water. There is a double bottom or steam



THE ACME OIL FILTER

chamber at E for heating the water in Nos. 1, 2 and 3. No. 4 is equipped with a steam coil in the base of the filter. F is the steam inlet—outlet is on the opposite side—for steam heating. A No. 0 has no steam connection. The five sizes have the following capacity in gallons: 7, 10, 25, 50 and 100. Nos. 1, 2 and 3 have double bottoms, as shown in cut, for admission of steam; No. 4 is equipped with wrought iron coil located in the double bottom. The steam attachment is said to increase the filtering capacity about 10 per cent. The Acme oil filter is manufactured by Walter L. Flower & Co., Chemical Building, St. Louis, Mo.

Consul Winslow writes from Liege, Feb'y 17, 1902, that the business outlook in that part of Belgium is much brighter, and that there is a good opening for American goods, especially labor-saving machinery. He says that he has recently had many calls for addresses of American firms engaged in various lines of manufacture, and that he is informed of an opportunity to furnish tools and machinery for an extensive rubber plant, as well as an outfit for a manufactory of enameled ware, communications in regard to which may be addressed to John Gross, rue Chevanfosse 13, Liege.

The Minerva furnace, at Bay View, Wis., operated by the Thomas Furnace Co., which has undergone extensive repairs during the past year, will be placed in operation about April 1. The furnace will have a capacity of about 200 tons a day. The stack was almost completely rebuilt, while 225 feet of dockage was built.

Modern Machine Methods.

The paper read before the English Institution of Mechanical Engineers by Mr. H. L. Orcutt on "Modern Machine Methods" has been recently published in *The Iron Trade Review*. It excited considerable interest abroad and at subsequent meetings of the Institute a very general discussion of the subject was undertaken, and at the close Mr. Orcutt replied to the various comments in a manner which drew from the president, Mr. W. H. Maw, the remark that the institution was almost as much indebted for the reply as for the original paper. We have condensed the closing of the discussion from the account in London *Engineering*.

Mr. Orcutt said that it had been assumed that his paper was arranged as an indictment of English engineering practice, and a eulogy on American methods. He had no wish to conceal his nationality, but he thought little was to be gained by making the national question one of prominence. Certainly nothing was to be gained by referring to shops other than English in the paper; but many of the criticisms or methods advocated would apply to that which is lacking in American practice as well as in English. His leanings were naturally American, and he had had large experience in America as well as in Germany. At the present time his home was in England, and he had the good of English shops and industries at heart. A residence of many years in England had taught him the labor-saving virtues of plain speech. He had made use of it in the paper, and proposed to make still further use of it in the reply. One of the speakers, Mr. Wicksteed, had inferred that while the milling operations shown and illustrated in the paper might be profitable when dealing with V-shaped lathe beds, they would hardly be advisable for the English pattern bed, and he would prefer planing. Vertical milling operations give very good results both in speed and accuracy. In the works with which the author was connected, turret-lathe beds were milled on vertical machines, never going to the planer at all, but being sent direct from the milling department to the scraping. The milling machines took one roughing and one finishing cut. Mr. Wicksteed further stated that the cutters would spring away from the work in taking heavy milling cuts, but this depended upon the rigidity of the machine in milling as much as in planing. Mr. Wicksteed also thought that three cuts might be necessary on account of this springing; but the author stated that in the work to which Mr. Wicksteed referred—namely, the finishing of V-shaped lathe beds—more than two cuts were never taken, one roughing on the milling machine and the finishing cut on the planer. In addition to these operations the beds were scraped. This question, like all others, must always be considered in view of circumstances, conditions, material, finish required, etc.

No one can justifiably say that, generally speaking, a milling machine is preferable to a planer, or the reverse. Mr. Rowan doubted the statement that milling machines can turn out the work two or three times faster than planers. Presumably this referred to heavy work, but the statement in the paper made reference particularly to medium or lighter work, and what was stated was repeatedly found to be the case. The great gain, as far as cheapness was concerned, was that one operator could attend to four machines, or even more. Mr. Rowan further questioned the statement that the planer is a neglected and long-suffering machine. The speaker could show a great many of the shops in which this statement could be verified. He would add that very hard iron, which is used in many cases where it is unnecessary, certainly much affects the products of machines. This question should receive serious attention. Mr. Rowan had also questioned the advantages of the vertical boring machine over the face lathe. The speaker would point out that for a large class of work it is not possible to incorporate in the lathe the power that can be applied in the vertical mill. Of course, in considering the vertical mill v. the face lathe, everything must be taken into consideration; each has their field; each has its usefulness and special points of advantage.

Mr. Rowan had warned engineers to be careful in making elaborate shop fittings; but Mr. Rowan had one of the most orderly and best-equipped shops with which the speaker was acquainted. He was glad this point had been brought up, for he believed that manufacturers, whether they wished to or not, would soon be compelled to improve in the matter of shop

fittings. Well-arranged, well-fitted, comfortable shops were an important factor in assisting to retain the best class of workmen. It should not be forgotten that amongst workmen the standard of living is becoming higher. What would satisfy them ten years ago would not satisfy them today. Education is opening up their ideas, giving them new ideals; wages are increasing, the purchasing power of money is increasing, and all these items point to the fact that a demand will soon be made for more respectable and better-fitted shops, in which workmen spend a great part of their lives. Orderly, well-kept, well-heated, dry shops assist in keeping the plant in good condition. Mr. Rowan could not understand how one foreman could take charge of 40 to 50 men. Mr. Orcutt thought he had in mind heavy work. Such a proportion of men to foremen often existed in light manufacturing, although the speaker would put it as the maximum. Mr. Rowan further doubted the statement that one foreman has charge of 150 men. Although names could not be mentioned, the speaker said this was repeatedly the case in manufacturing concerns in England. In regard to the pay of foremen, he was sorry to say that he knew it was the deliberate policy of many manufacturers not to pay foremen over 50s. a week, in fact, 45s. a week was not an uncommon wage.

In regard to what had been said about standardizing, there seemed to be some misunderstanding. The author's meaning was, that when new methods are presented to manufacturers which may seem to be American, they immediately assume that those methods cannot be adopted unless they can standardize their work, specialize it completely, and make in very large quantities. Many of the best American methods could, Mr. Orcutt continued, be adopted without any of the conditions mentioned being taken into consideration, although, of course, they are in themselves rather American ideas, particularly specializing, and making in large quantities. Limit-gauge systems can be adopted, proper boring outfits can be put in, grinding machines can be installed, all without manufacturing in quantities, or demanding specialization. Standardizing dimensions would certainly assist, however, in reducing the amount of outfit. He had recently been connected with a case in which certain works were considering the adoption of limit-gauges. On one shaft to be machined there were a great many different dimensions, and he was asked to note the number of different gauges that would be necessary. Of course the reply was that they should begin to work in their drawing-room to reduce the number of different dimensions. As long as the old-fashioned methods of calipers and rule were in use, standardizing dimensions would not make much difference, for a lathe tool will turn out one dimension as well as another. But when boring and limit-gauges are in question, the use of as few dimensions as possible means a reduction in the cost of outfit.

Mr. Adamson had shown to the members a sample of grinding in the shape of a spindle. This was, the speaker said, an example of the ancient rather than of the modern machine-tool method. It was a sample of what skillful hand labor could do, and had nothing to do with modern machine work. Mr. Donaldson had very rightly pointed out that it might be much more easily finished if high and low gauges were employed, and possibly in time automatic grinding machines will take the place of the hand labor of this particular part. Mr. Adamson had stated that he had seen a turret machine which had been in use for twenty years. The speaker had seen in textile machinery shops turret machines which he should think must have been in use fifty years, and it was high time they were replaced.

Explanation had been asked as to what is meant by three men working on one piece in the forge. This reference was to forging machine parts. He would take the case of a lathe spindle or milling-machine spindle. It was in many cases much more easily and cheaply roughed down from the bar, one man running three lathes, while in the old-fashioned method two or three men would forge this piece in the smith's shop. The apparent loss in chips was of very little importance, as labor was the item which adds to the cost; and material, as far as it is wasted in chips, was of no consideration. Of all the equipment in English shops, as far as he had observed, the forging plants were about the worst, particularly those dealing with light work; in heavy work they were well advanced.

Mr. Donaldson had referred to the use of soft material. He would point out that the wearing qualities of metal are not always dependent on its hardness. Americans, in their efforts to produce easily-machined parts, perhaps went too far in making use of soft metals. The English went too far in making use of hard metals where there is no occasion for them to be put in. More suitable metal would be obtained if there was an exact knowledge of the cupola mixtures, and laboratory knowledge to control the composition. He could not agree with Mr. Donaldson that tool-rooms should be equipped and extended to deal with all kinds of manufacturing of tools. This might be true in very large works, and particularly in those with which Mr. Donaldson had to deal, but for the ordinary works it was a mistake to attempt to manufacture too much in the tool-room. Catalogue articles, such as reamers, taps, dies, cutters, etc., could be much better bought. The tool-room should be particularly for dealing with special work in the way of tools and appliances which are repeatedly called for in manufacturing establishments, and the production of which cannot be readily undertaken by outsiders.

Turning to the apprenticeship question, the speaker considered seven years too long for apprenticeship. It should not be forgotten that with the aid of machines and tools the ordinary laborer can in many cases perform work which previously demanded years of training. He thought members would be interested to have a short statement as to some of the terms of apprenticeship made use of in the shops with which he was connected:

Thorough machine constructor: Course of four years—eight months each in fitting, turning, and screw machine, planing and milling department. Remainder of four years divided between erecting, grinding, gear-cutting, smith's shop, pattern-shop, and foundry. *Fitter:* Eighteen months in fitting department; remainder of three years in turning, planing, milling, erecting, gear-cutting, smith's shop. *Tool-maker:* Twenty-four months in fitting; remainder of three years in turning, screw department, planing and milling, grinding, polishing, smith's shop, and tempering. *Turner:* Twenty-four months in turning and screw machine department, remainder of three years in grinding, fitting, smith's shop. *For planing and milling apprentice:* Three years, similar to turner. *To become smith:* Works in tempering-room. *Pattern-maker:* Six months in foundry. *Molder:* Six months in pattern-making.

Mr. Orcutt could not agree with Colonel Crompton that the fitter was going out of date altogether. A mistake very often made was that of attempting to reduce costs by doing away with fitter's work entirely, for this often meant a sacrifice of quality. Mr. Weir had stated that heavy work included the larger part of the engineering in England, and was also that in which the country excels. It was difficult to get figures, but, judging from the returns given by the trade unions, the author found that there are some 338,000 members engaged in metal, engineering, and shipbuilding industries. Of these what he would term heavy engineering, including shipbuilding, there are 65,000 members: even adding the amalgamated engineers to these, he found that less than one-half of the union members are engaged in heavy engineering work. He agreed that a large part of the heavy work done in this country is the equal of any. It certainly is thoroughly good work, but usually could be done much more economically if light engineering received more attention, particularly the tool-room and gauge department. He could not agree that shop railways should only be for heavy work, but was of opinion that shop space is secured by having works in order.

Mr. Weir had stated that for chucking operations the face-plate lathe appears as good as any other machine, and thought extra power in a mill is not of much advantage. This was right in a certain way, but high speeds and light cuts very often absorb as much power as slow speeds and heavy cuts. Mr. Richardson had stated that Americans overdo specifications that magnify accuracy. There might, the speaker said, be something in this; but he thought that most Europeans who visit American shops do not see that the aim of the American very often is to do his work just as bad as he can, and still have it passed. His equipment of gauges and tools is very often astonishing to the European; but one of the objects of gauges and proper tools is to secure work good enough, but not too good. Extreme accuracy in outfit is often needed to attain this end.

Mr. Lewis Ransome had asked how the high speeds of milling mentioned are attained. The speed in this particular instance was attained by using soft castings, which were perfectly suitable for the purposes in view. The cutter was of ordinary best quality Sheffield steel. Different speeds are attained for planing through variable speed countershafts. He especially recommended to the notice of members the magnetic clutch mechanism described and illustrated. As to quality of finish in the fast grinding machine, no better example can be given than the Corliss valve shown. This valve, about 3½ feet long and 6 inches in diameter, was finished with an accuracy of .0005 inch in length and .002 inch in diameter.

Mr. Hill had asked for one shop in this country to be instanced where one man attended six milling machines. At Messrs. Hutchinson, Hollingworth, and Co., Dobcross, two operators attend to 13 milling machines. Both union and non-union men are employed in their works. It had been asked why it took 45 minutes to grind a shaft shown on the platform. This particular example was a thin piece of hollow tubing, and therefore would not stand heavy pressure and cuts necessary to extreme rapidity in finish. He thought, however, 45 minutes was amply quick enough to satisfy the most exacting.

In concluding, the author said he was pleased to note the responsive sentiment of approval shown by many of the members, but he should like to criticize the critics. They said he was too general; he thought they were too specific and that criticisms had been made mainly from too narrow a standpoint. This led up to the consideration that manufacturers generally do not know enough about each other. They do not visit each other's shops, nor exchange ideas, open their own places for inspection, nor study other methods. It was wonderful to find, even in the worst shops, the highly developed details which often exist. He was sure it was a failing among English engineers—the exclusiveness with which they treat their manufacturing methods, and the stay-at-home qualities exhibited by them. He had thought best, as the paper had been criticized as an indictment of English shops, to tell the meeting straight and clearly, as briefly as possible, what seemed to him the exact position which English engineers occupy. He should say they were advanced in heavy milling, heavy planing, fast turning. They were also skilled in many branches, such as shipbuilding, locomotive work, marine engine building, high-speed engines, textile machinery, and cycle work. In these he thought no one excelled them, no product was superior. He would next mention those points which were generally understood, but not yet well advanced in English engineering practice. They were: Light milling; turret machine work; the use of the vertical boring mill. Gear-cutting was rapidly developing, but only recently. That which was neglected by the majority of shops was: Proper gauge equipment; the use of grinding machines; tool-room practice and the use of small tools, and the apprentice question as applied to modern conditions. The questions that were rarely attended to were: Analysis of material; good shop fittings; comforts and conveniences for the men. These things were included in the paper; those which were not mentioned in the paper, and which are also rarely attended to by manufacturing engineers, were: Systems of rewarding labor, accurate cost keeping, and social and economic conditions as affecting the efficiency of workers.

The Ingersoll Sergeant Drill Co., 26 Cortlandt street, New York, has just received an order from the Gold Creek Consolidated Mining Co., of Jersey City, for a complete outfit, consisting of air compressors, receiver, drills, drill mountings, boiler and all fittings. These are to be used at the Mascot group of mines, situated in Pierce City Mining District, Shoshone Co., Idaho, and near the town of Orofino. The company has also just placed an order with the Allis-Chalmers Co. for fifteen 5-ton stamps, in addition to the ten already in use, bringing the capacity of the mill up to 125 tons. The president of the company is Capt. E. E. Rodgers and the general offices are at 25 Broad street, New York City.

The molders employed in the foundries operated by Williams, White & Co., Bernard & Leas, Moline Elevator Co. and the Moline Pump Co., of Moline, Ill., have been granted an advance in wages from $2.50 to $2.75 per day.

NEW METHODS IN STEEL MANUFACTURE.

Several interesting patents have been granted recently on sundry processes for steel manufacture. Some of them, like the one granted to Sylvester A. Cosgrave, of Pittsburg, are but an addition to a series covering methods employed in the production of ingots. These preliminary inventions are sufficiently outlined in the present description to permit the one account to serve as a summary of the project in general, and as far as possible the description is condensed from the language of the inventor without the intrusion of any other opinion. The Cosgrave invention relates to improvements in the manufacture of a compound ingot—i. e., an ingot having varying percentages of carbon in its different parts.

The Production of Compound Ingots.

It has been characteristic of the compound ingots heretofore produced that there is a sharp and well-defined line of division between the two grades of metal forming the ingot. The line of division is due to the methods employed in the manufacture of ingots. These can be generally classified under two heads. One method consists in casting the two grades of metal on opposite sides of a thin metal plate, the integrity of which is destroyed by the molten bodies of metal. The other consists in casting one body of metal in a mold having a movable wall, which is withdrawn as soon as the first body of metal has hardened sufficiently to preserve its shape and the other body of metal cast against the exposed face of the first

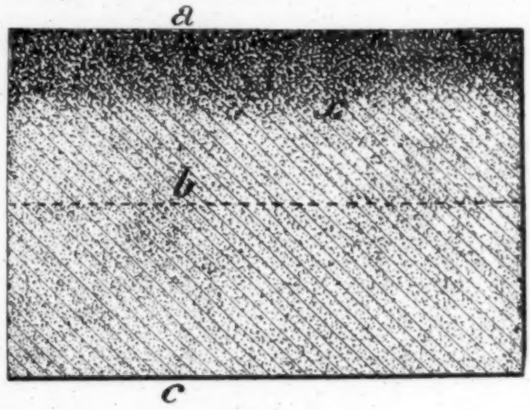


FIG. 1.

body. In the practice of this method the molten metal in contact with the movable wall becomes chilled and solidified, forming a thin metal wall, which is so softened when the second body of metal is cast against it as to permit a welding of the two bodies together. It is characteristic of both of these methods that between the two bodies of metal is interposed a solid metal wall, which although it may be melted and its integrity destroyed will retain its integrity for a sufficient length of time to prevent an interchange of chemical and physical characteristics between the two bodies of metal. It is probable that the thin metal plate or sheet employed in the practice of the first method introduces a foreign element, which although the sheet is destroyed would prevent the interchange of characteristics, and in the second method it is probable that the surface exposed on the withdrawal of the movable wall becomes oxidized or otherwise chemically changed, and thereby prevents the desired interchange of characteristics.

While the sharp definite separation of the two bodies of metal characteristic of compound ingots heretofore produced may be due to causes other than those stated, such demarcation or stratification of the metals always occurs. This stratification of the metals is not especially detrimental when the articles formed therefrom are not subjected to excessive strains, but is fatal when the article, such as armor-plate formed from such a compound ingot, is subjected to excessive strains. Under such conditions the two metals separate along the plane of stratification.

The Cosgrave invention consists, generally stated, in an ingot formed of two bodies of metal so united that there will be a gradual change of characteristics from one body to the other.

In the accompanying drawings, Fig. 1 is a sectional plan view of a compound ingot wherein its characteristics gradually

change from one side to the other, and Fig. 2 is a similar view of an ingot wherein the characteristics change gradually from the outer surfaces to the center. The ingot forming the subject-matter of this case may be produced in several ways—described in several patents issued to Mr. Cosgrave.

The method consists in casting one body of metal—*e. g.*, high-carbon steel—in a mold having a movable wall, removing said wall and causing another body of metal, as low-carbon steel, to flow up along the exposed surface of the first body, and thereby melting the thin skin, allowing the two molten bodies to come together without disturbance. In order to protect the surface of the first body as against any elemental change which would tend to prevent the amalgamation of the adjacent portions of the two metals, the surface of the movable mold-wall against which the first body is cast is covered or coated with a material which will prevent any elemental change of the metal of the first body or will reconvert the portions of the first body elementally changed. Both bodies of metal are cast on opposite sides of a movable partition, which is gradually withdrawn as the casting proceeds. In the practice of this method it is preferred that the exposed surfaces of the partition should be formed of a material which will prevent elemental change in the metals cast or will reconvert any elementally-changed metal. By either of these methods two qualities of metal, as high and low carbon steel, are brought together under such conditions that while certain portions of each grade will be unchanged, or practically so, there will be an interchange of qualities from one to the other such as to result in a gradual merging from the high carbon of one to the low carbon of the other and without any line of cleavage between the strata or layers. The gradual or decremental change from one quality to the other is clearly shown in the cross-sections of ingots as actually made. The lines *a b* represent approximately the thickness of the stratum or layer forming the high-carbon body, and the lines *b c* in Fig. 1 or *b b* in Fig. 2, represent approximately the thickness of the stratum or layer forming the soft-metal body as these bodies or strata were proportioned in that casting. As the exterior walls of the ingot became rapidly solidified and as it is desirable that the surfaces should be unchanged, the inventor found that in the particular case here illustrated the interchange or interdiffusion of the properties of the two qualities of steel thus employed existed substantially between the points *x* and *y*—that is to say, in consequence of the interdiffusion referred to the steel gradually changes or becomes reduced in carbonization from the points *x* to the points of lowest carbon, which in Fig. 2 would be the center of the ingot, as at *y*, but in Fig. 1 would be at one side of the ingot—and this he has found to be the case generally throughout the compound ingot—that is, through other planes or sections.

To Shorten the Time in Open-Hearth Process.

Wm. White, Jr., consulting engineer, of Pittsburg, was granted a patent under date of March 11 for an improvement in steel manufacture, which the inventor hopes will possess in practice the following advantages: First, the blast furnaces are not required to make basic pig, and, secondly, the innovation will have a very large increase in the product of an open-hearth steel plant and a correspondingly greater return on the invested capital. The inventor says that the invention relates to the manufacture of open-hearth steel, and has for its object the shortening of the time required in the elimination of the silicon, carbon, phosphorus, etc., from the metal and a more perfect control of this process. The length of time required for the treatment of metal by the open-hearth method is the principal objection to its practice. Under usual conditions of practice it is impossible to make more than twelve to eighteen heats a week, dependent upon the percentage of silicon, carbon, etc., contained in the metal treated and the extent of elimination required. The long time required in the treatment of the metal in the open-hearth process is due largely to the fact that the eliminations or reductions of the silicon, carbon, etc., are to a large extent successive, being effected at different temperatures—that is to say, the elimination of the silicon occurs at a lower temperature than that of the carbon and ceases almost entirely at the temperature at which the carbon is eliminated most efficiently by reason of the greater affinity between oxygen and carbon at such a high temperature. It has been attempted to employ bessemerized metal in the open-hearth process, the silicon, carbon, etc., being eliminated as far as possible in the converter and the metal transferred to the open hearth for further treatment. This method has not been practically successful as the metal is too hot after treatment in the converter and must be allowed to cool before open-hearth treatment can begin, and, further, in the bessemerizing treatment the temperature is increased so rapidly by the oxidation of the silicon that it passes beyond the desiliconizing temperature before all or the desired percentage of silicon is eliminated, so that the metal when transferred to the open hearth is too high in silicon, and such excess must be removed in the open hearth.

In the practice of this invention molten metal as a desiliconizing temperature is charged into a converter and blown to effect an elimination of the silicon. In the oxidation out of the silicon from a fifteen-ton charge containing two per cent silicon between nine and ten million heat units will be developed by the continuation of the blast for ten minutes. The development of this heat, unless neutralized, would soon raise the metal beyond the desiliconizing temperature—*i. e.*, to a temperature at which the oxygen has greater affinity for carbon than silicon—and that before the silicon has been sufficiently eliminated. Hence I provide for maintaining the metal at a desiliconizing temperature until the carbon lines in the spectrum show that the elimination of carbon is actually progressing. A convenient means for preventing an injurious or detrimental increase of temperature by the burning of the

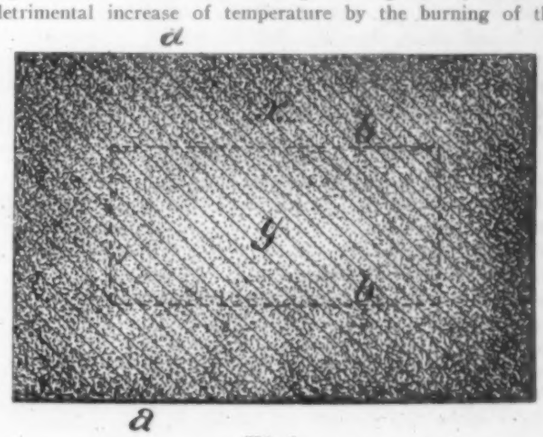


FIG. 2.

silicon consists in forcing steam into the converter with the air. I have found that if in treating a fifteen-ton charge of metal containing two per cent silicon steam at or about one hundred and twenty-five pounds pressure be forced into the converter through a pipe one and a half inches in diameter the metal can be maintained at a desiliconizing temperature and any desired percentage of silicon removed. As soon as all or the desired percentage of silicon has been removed the metal is transferred to an open-hearth furnace by any suitable means and there treated for the removal of carbon or phosphorus or impurities by any of the usual or known methods.

It will be understood that during the latter part of the treatment in the converter the steam may be partially or entirely cut off, so that the temperature of the metal will be increased to or nearly to the point at which carbon is oxidized, so that when charged into the open-hearth furnace decarburization may proceed immediately, and there will not be any delay in heating the bath to the required temperature. As there will not be any material oxidation of the iron in the converter as long as either silicon or carbon is present, the metal will not be in any way injured by the Bessemer treatment. As the metal is desiliconized rapidly in the converter and as only the carbon or a portion thereof has to be removed in the open-hearth furnace, it is evident that time required in reducing the pig iron to steel will be very much shorter than in the ordinary open-hearth treatment and that this shortening of the time will not produce any injurious effects on the metal.

Hydrogen Treatment of Bessemer and Open-Hearth Steel.

Thomas Andrew, of Richmond, and Thomas K. Bellis, of London, England, have patented (March 11) the following method of manufacturing high-grade steel from low-grade metal:

"This invention consists in a process for the treatment of either Bessemer or open-hearth steels, whereby the same may

be cheaply and efficiently converted into steel having a crystalline fracture of absolute regularity and fineness and possessing the well-known qualities of steel produced by cementation, subsequent melting in crucibles and casting, and commonly known as 'crucible' steel."

The salient feature of the process is the use of hydrogen as an element that will impart to the product of the Bessemer and open-hearth processes the qualities wanted. The affinity of this gas for metals is well known, and it appears that iron especially naturally contains it in greater or less quantity. It is the inventors' belief that one of the prime reasons why Bessemer and open-hearth steels have not the high quality of crucible steel is that in the process of manufacture much of their hydrogen is lost. They are convinced of this by the following considerations—viz., first, because since the heating of steel up to the molten condition means the forcing out of its gases, while cooling it means, at least up to a certain point of temperature, the reabsorption of gases, it is not an undue extravagance to assume that even the hydrogen which remains after the metal has been put through extreme heats in process of manufacture would in the Bessemer and open-hearth processes be attacked and burned by the atmospheric oxygen to which those processes permit it to be exposed and which it tends to absorb during the cooling stage (thus incidentally accounting in a measure for the phenomenon known as "recalescence," or that condition in the cooling metal where tecurs a temporary glowing); second, because experiments by Prof. Arnold and others show that bubbles formed in open-hearth and Bessemer steels are often bubbles of hydrogen. It became the object, therefore, to treat Bessemer and open-hearth steels with a view to recharging them with the lost hydrogen, and so imparting to them the superior quality of steels made after the more cumbersome and tedious crucible process—a process wherein at least no such undesirable combining of the hydrogen (and also the carbon for that matter) of the metal with atmospheric oxygen is permitted and where the loss of hydrogen, if any, is inappreciable. To this end, therefore, in carrying out the new process, first heat the Bessemer or open-hearth bars or billets in an ordinary closed air-furnace, subjecting them to a good soaking heat—*i. e.*, a heat sufficient to appreciably open the pores or grain of the metal and being, it may be noted, slightly greater than that of the recalescent point. The billets when at a bright-red heat—*i. e.*, when their grain is appreciably opened—are quickly withdrawn, laid on a suitable support on a sand floor, and at once covered with a suitable bonnet, into which is injected a jet of pure hydrogen. By contact with the metal the gas will be ignited, serving to effect the exhaustion of what air is initially inclosed in the bonnet with the billets. When the air is completely exhausted, the metal remains in a bath of pure hydrogen gas, which it freely absorbs. The metal may remain exposed to the gas for, say, fifteen minutes, though longer, if desired. When the metal cools, the hydrogen is not only retained mechanicaily in combination by the closing of the pores or grain of the metal, but chemically, for the hydrogen absorbed has combined with the carbon of the metal. At this stage, therefore, a union will have been formed between the iron, the carbon, and the hydrogen, the latter acting as a binder between the other two. The homogeneity of the union is of course materially enhanced by the thorough opening of the pores of the metal, thus permitting a perfect exposure of the carbon to the hydrogen; but the union thus effected has not caused the quality of the steel to be improved, though the hydrogen is established in the composition with adequate tenacity, it requiring a melting heat to bring about its separation from the metal after being once incorporated therein. The carbon, which is a fugitive element, under reheatings and temperings is neither fixed nor crystallized consistent with the superior quality which the product is intended to possess. To quite perfectly fix and crystallize the carbon, therefore, the steel is next chilled. This is effected by first heating the billets (whether or not they have meantime cooled is not absolutely essential) to a white heat, if they are of low carbon, (.10 per cent or .15 per cent) or to simply a red heat, if they have above that percentage of carbon, (and to avoid danger of fracture when chilled their carbon should not be over .85 per cent), and then cooling them in any suitable chilling-bath which does not evolve oxygen, oxygen having a deleterious effect on the steel. It should be remarked that by preference the billets are formed not smaller than three or four inches square. A perfect and homogeneous crystallization is best secured by great pressure acting supplementary to the effects of heat, and this is secured by not making the billets too large, so that when they are subjected to the chill the sudden contracting and molecular tension which results in the outer shell of each billet coacts with the heated and resisting inner part to effect an unusual state of hardness in the outer shell.

THE FARWELL UNIVERSAL MOLDING MACHINE.

The accompanying cuts illustrate two types of the Farwell universal molding machine for foundries, manufactured by the Adams Co., of Dubuque, Iowa. This device provides means by which an inexperienced man is enabled to do the work of a skillful molder, and when a skillful molder is the operator he can greatly increase his day's work. The Farwell machine combines the "squeezer" feature of the plain molding presses with the pattern drawing feature. It can be used either with or without stripping plates. When used with stripping plate, the pattern, which is secured to a frame, rests firmly on the machine table, and the stripping plate rests firmly on the pattern frame. Pattern and stripping plate do not rest on the lift table, but are supported by the rigid machine table,

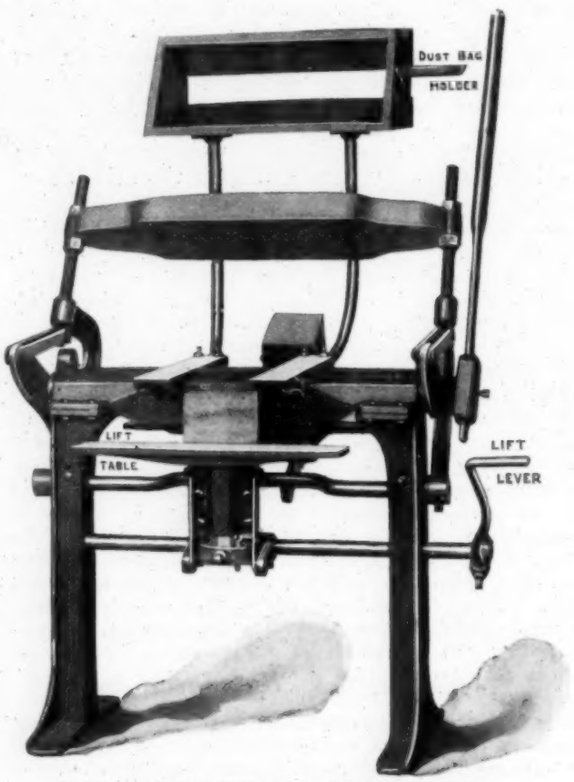


FIG. 1—30-INCH STATIONARY MOLDING MACHINE

where they can withstand the ramming and pressing of the sand. The stripping plate is supplied with studs that extend down and rest on the lift table. When the lift lever is operated the lift tables are raised, thus raising the stripping plate and drawing the pattern.

When this feature is used without stripping plate, it is called the "lift off" method. These patterns, like stripping plate patterns, are necessarily in two sets, one for copes and the other for drags, unless the work is of the symmetrical type and both copes and drags can be made from the same half pattern. The half patterns are secured to a plate. Studs resting on the lift tables extend up and pass loosely through the pattern plate and engage with the flask. When the lift lever is operated and the lift tables raised, the flask is lifted off the pattern. A recommended method of running small flasks is to press the sand and draw the pattern in both cope and drag, side by side, in one operation.

A shaft recently made at the Allis-Chalmers plant, Milwaukee, Wis., for shipment to the Newburg plant of the American Steel & Wire Co., at Cleveland, O., weighed 156,000 pounds. The shaft is 34 feet 6 inches long and 30 inches in diameter.

BRITISH WESTINGHOUSE SHOPS AND LABOR.

Consul S. C. McFarland, of Nottingham, Eng., has sent to the State Department a recent contribution of D. N. Dunlap to the Nottingham *Guardian*. The article relates particularly to the construction of the British Westinghouse Co.'s works at Manchester, Eng., but it has an important bearing on the general discussion that has gone on for some time in Great Britain, on American vs. British manufacturing methods, efficiency of mechanics, restrictions of unions, etc. The article reads in part:

"The recent achievement of the British Westinghouse Co. at Manchester has caused heart-searching in the building and electric trades. It is now a little more than two years since the Westinghouse company decided to establish works for the manufacture of electrical apparatus in this country. The works are designed on a magnificent scale, but the most remarkable thing about them is the way in which the building has been accomplished. One hundred and thirty acres of ground are covered by the various buildings, and 10,000,000 bricks had to be laid. When the work was begun in the spring of 1901, it was estimated by British builders that the building operations alone, quite apart from the installation of machinery, would occupy several years, and estimates in work of this kind proverbially take an optimistic view not borne out by subsequent events. The Westinghouse company, however, had no mind to waste time and their shareholders' money on lengthy preliminaries. They engaged Mr. James C. Stewart, a contractor of St. Louis, Pittsburg, and New Orleans, as building manager; and Mr. Stewart, with half a dozen young assistants from the other side of the water and 3,758 British workmen, achieved what every onlooker, prophet, or critic would have dismissed from serious consideration as an absolute impossibility. He established an average of 1,800 bricks per man in a nine-hour day, with a maximum of 2,500 bricks per day for the plainest work.

"How was it done? is the question which at once arises. It is certain that Mr. Stewart left no legitimate device untried, and no less certain that he had every detail of the work absolutely under his control. Daily reports from all the foremen and sub-foremen were handed in to him, and men who were not up to the work were not kept on. During the third week of operations, the average had risen to 900 bricks per man per day, and by the continuous process of weeding out the idle and useless, the high standard of 1,800 bricks was gradually approached. The trades union did not allow the 'new methods' to proceed in silence, and once or twice it looked as if trouble might be in the air. In every case, however, matters were smoothed out without having recourse to unpleasant proceedings. Managers and delegates met amicably enough, and the officials of the company, with that strength of purpose and energy the want of which in the British employer of the last two generations has been so deplorable, made it perfectly clear that while they would pay their workmen not only the standard union wage, but an even higher wage than the union required —11d. (22 cents) an hour instead of 10d. (20 cents)—they meant to manage their own business and would not brook interference from outsiders. If these terms were not acceptable, means would be found of dispensing with the good offices of the union and its members. The result was peace with honor.

"This remarkable feat is all the more interesting that it comes at a critical moment in our industrial history, when the bricklaying capacity of the British workmen is being most unfavorably contrasted with the capacity of workmen in other countries, and furnishes the original premise from which a logical, if depressing, chain of arguments deduces the approaching decline of the Empire. A writer in the *Times* of November last placed the recognized limit for dwelling houses, shops, and business premises built by a private contractor at 400 bricks per man per day; the limit in the case of public buildings he quoted much lower—330 bricks per nine-hour day. This computation was not allowed to pass unchallenged, but careful inquiries establish the fact that the number of bricks per man per day is considerably less than it was twelve to fifteen years ago, though rather greater than two or three years ago.

"At the Westinghouse works, there was no wasting of time, no loafing, smoking, gossiping, neither was there any bullying or harrying of the workmen. Mr. Stewart obtained with British labor results that are absolutely unique in the records of British industry. The methods were characterized by a dash and energy unfortunately not now regarded as typical of this country. But what has been done can and will be done again. At least, we have positive proof that there is in the British workman that stuff that will successfully build up a great enterprise if he be properly directed and adequately supervised. The great buildings are completed; the work for which they have been provided remains to be done. While the building was going on, a number of young British engineers in the employ of the company were sent to the machine shops at Pittsburg for further training. A leading northern daily waves away with scorn the 'damaging and humiliating' inference that British engineers have any need to learn in the United States, and prefers to suppose that these men have been sent out in order to familiarize themselves with the 'peculiarities of American machine-shop practice,' and 'with methods and ideas which, if not better than our own, are different, and have to be studied on the spot.'

"The inference may be damaging; it is nevertheless one which, with the premise before us, we can hardly fail to draw. The British engineer may have his trade at his fingers' end;

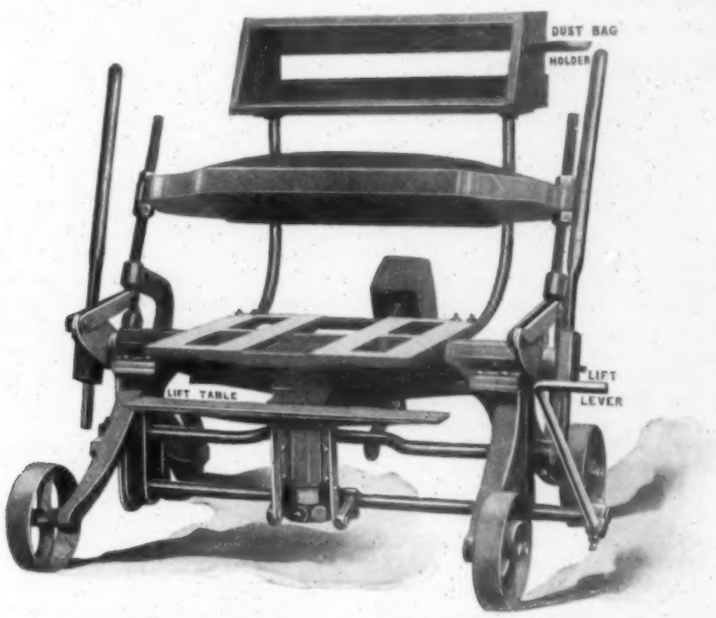


FIG. 2—38-INCH PORTABLE, LOW TABLE MOLDING MACHINE.

it is possible that, from a technical point of view, he has nothing more to learn. At the same time, it is important for this great new industry that he should familiarize himself with these 'methods, different from our own,' since they produce results which do not seem to be within the reach of any methods at present known to British business men. The manufacture of electric apparatus in these buildings will be carried on on new lines, though successfully tried in the United States. The enterprise is one of the first stages on our return journey to that front place in the industrial world which we have temporarily lost. A frank avowal that our methods are capable of improvement and must be greatly altered and improved is the first necessity."

In commenting upon this, the *Guardian* says editorially: "If it is a fact that bricklayers can lay 1,800 bricks per day, but that they persistently refuse to lay more than 330 or 400, we can not be surprised that the cost of building has increased so much within recent years and that it has become so difficult to get building work done within a reasonable time. If it be true that the 'go-easy' principle is carried to this length in the building trade, we may safely assume that it exists in other industries, and we have an explanation at once of the reason why British products are being ousted from the markets by the products of Germany and America. It is only fair to wait to see what there is to be said on the other side; but the article on the erection of the British Westinghouse works constitutes a damaging indictment of British trade methods, and it ought to be answered, if an answer be possible."

WESTINGHOUSE BLOWING ENGINES.

The Westinghouse Machine Co., East Pittsburg, Pa., has entered the field as a manufacturer of blowing engines, and last week Julian Kennedy of Pittsburg awarded this concern the contract for the erection of six engines to be installed at the blast furnaces of the Toledo Furnace Co. of Toledo, O., and the South Chicago Furnace Co. of South Chicago. They will cost $175,000. Three engines will be built for each furnace, and they will be so arranged that they can be run as compound or single engines. Each set will consist of two high-pressure and one low-pressure engine. The low-pressure engine will be used as an auxiliary, and when it is in use the high-pressure engine will receive steam at the boiler pressure and exhaust into the receiver from which the low-pressure engine will be supplied. When the low-pressure engine is in use as a simple engine it will receive steam from the boiler through a reducing valve.

Each high-pressure engine will have a steam cylinder 50 inches in diameter, fitted with the most modern design of Corliss valve gear. The low-pressure steam cylinder will be 96 inches in diameter and will be equipped with the same appliances. The air cylinder in all engines will be 96 inches in diameter and the stroke will be 66 inches. The engines will make 60 revolutions per minute. The air cylinders will be equipped with the Kennedy piston inlet and outlet valve.

The engines will be of a special type, with the blowing cylinder immediately above a heavy bed plate. On top of the blowing cylinder will be a heavy housing and guide box and on top of the guide box will be the steam cylinder. The advantage is that the engines are very compact. Each will weigh 600,000 pounds, and will have two flywheels 20 feet in diameter, each weighing 65,000 pounds.

The Westinghouse company has also become a competitor in the horizontal Corliss engine field. It has taken the contract for two such engines of 3,000-horsepower each from the Auburn Interurban Railway Co. of Auburn, N. Y. These engines will cost $70,000. The company has just completed the shipment of eight of the heaviest engines ever built, each having a capacity of 10,000-horsepower. These engines have been sent to the New York Edison Waterside station. The company is also shipping two vertical Corliss engines of 2,000-horsepower each to the new works of the British Westinghouse Co. at Manchester, Eng.

The Chicago Pneumatic Tool Co., Monadnock Block, Chicago, will remove its general offices May 1st to the tenth floor of the Fisher Building, where it will occupy nearly the whole floor.

DENVER MACHINE SHOPS AND THE UNION.

Strikes in the machine shops of Denver, Col., have led to the issuance of a declaration of principles by the machinery manufacturers of that city. The machinists' union ordered a strike on Oct. 20, 1901, and it has been in progress since. The manufacturers state, however, that the shops have been running with a full force and that the output has been maintained at the full capacity of the plants. The declaration referred to is given below and is signed by the F. M. Davis Iron Works Co., the Vulcan Iron Works Co., C. M. Anderson Forge & Tool Works Co., the J. H. Montgomery Machinery Co., the Denver Iron & Wire Works Co., the Denver Engineering Works Co., the Pioneer Iron & Wire Works Co., the Card & Weber Machine Co., G. M. Livingstone, the P. Richter Ornamental Iron Works, and the Colorado Iron Works Co.:

"WHEREAS, The International Association of Machinists formally entered into an agreement on May 18, 1900, for the express purpose of avoiding strikes and lockouts by arbitration of disputes between employers and employes; and,

"WHEREAS, It was specifically agreed that pending arbitration there should be no strikes and lockouts; and,

"WHEREAS, In direct violation of that agreement the International Association of Machinists arbitrarily and officially ordered and instituted strikes in many shops throughout the United States on May 20, 1901, and subsequent thereto; and,

"WHEREAS, A resolution was adopted on the 28th day of May, 1901, to the effect that the International Association of Machinists had wilfully violated this agreement of May 18, 1900, and had made the same null and void and that the agreement was no longer binding on the Denver Machinery Manufacturers' Association;

"Therefore, We, the members of the Denver Machinery Manufacturers' Association of Denver, Col., believing the International Association of Machinists, from its past record, to be an organization totally unreliable, untrustworthy and irresponsible, shall in future have no dealings with it as an organization, and declare the following to be our principles which shall govern us in our relations with our employes:

"First—Since we, as employers, are responsible for the work turned out by our workmen, we must therefore have full discretion to designate the men we consider competent to perform the work and to determine the conditions under which that work shall be prosecuted, and the question of competency must be determined solely by us; and, while disavowing any intention to interfere with the proper functions of labor organizations, we will not submit to any interference with the management of our business.

"Second—Disapproving absolutely of strikes and lockouts, the members of this association will not arbitrate any question with men on strike.

"Third—The number of apprentices, helpers and handymen to be employed will be determined solely by the employer.

"Fourth—Employers shall be free to employ their employes at wages mutually satisfactory. We will not permit employes to place a restriction on the management, methods or production of our shops, and will require a fair day's work for a fair day's pay. Employes will be paid by the hourly rate, by premium system, piece work or by contract, as employer may elect.

"Fifth—It is the privilege of employes to leave their employment whenever they see fit, and it is the privilege of the employer to discharge any employe when he sees fit.

"Sixth—The above principles being absolutely essential to the successful conduct of our business, they are not subject to arbitration.

"Seventh.—In the case of disagreement concerning matters not covered by the foregoing declaration, members of this association will meet their employes either individually or collectively and adjust any difficulty on a fair and equitable basis. In case of inability to reach a satisfactory adjustment, the matter will be submitted to arbitration by a board composed of six persons, three to be chosen by the employer and three to be chosen by the employe or employes. In order to receive the benefits of arbitration, however, the employe or employes must continue in the service and under the orders of the employer pending the decision.

The Jarecki Mfg. Co., of Erie, Pa., is said to be receiving some large contracts for brass goods for the London market.

STEEL CORPORATION IMPROVEMENT PROGRAM.

The expenditures for improvements contemplated by the United States Steel Corporation, and amounting to nearly $30,000,000, will include $10,000,000 for the extension and enlargement of the plants of the National Tube Co. The report that a Bessemer steel plant is to be erected at Wheeling, W. Va., is officially denied. Extensions will no doubt be made to the pipe and tube mills and improvements have been planned that will make the present plants modern in every particular. The exact nature of the improvements, however, has not yet been given out. The extension of this line of the United States Steel Corporation's properties means that it will make itself almost impregnable in the merchant pipe and casing field. During the past two years a large number of independent mills have been erected and today the capacity of these mills is fully one-half of that of the National Tube Co. Despite this constantly increasing competition the tonnage booked monthly by the tube consolidation is greater this year than ever in its history.

Other improvements to be provided for include an extension to the armor plate plant at the Homestead Steel Works, an angle mill at this plant and also a structural and fitting works which will be large enough to consume nearly the entire product of the structural mills of the Homestead plant. This latter improvement will come under the jurisdiction of the American Bridge Co., which is to be a greater fabricator of material than heretofore. Although it has not yet been definitely decided it is stated that additions to the plants of the American Bridge Co. will be made in order that almost the entire output of the structural mills operated by the Carnegie Steel Co. and the Pencoyd Iron Works will be fabricated before being placed on the market. In this way this material will be sold in a semi-finished state ready for erection. Other improvements to be provided for call for an expenditure of several millions for the improvement of the Bessemer railroad, while it has been intimated that the mills of the American Steel Hoop Co. at Youngstown, O., will also be enlarged. A meeting will be held in New York shortly when all improvements to be made will be definitely decided upon.

Consolidation of Welsh Sheet and Tin Plate Mills.

The London *Ironmonger* announces the probability of another amalgamation in the English steel trade. The new company will comprise the following firms: E. P. & W. Baldwin, Ltd., steel sheet and tin plate manufacturers, of Wilden, near Stourport, Swindon, near Dudley; the Stour Vale sheet mills, Kidderminster; and the Cookley Mills, Brierley Hill; Wright, Butler & Co., Ltd., of Elba Steel Works, Gowerton, near Swansea; Landore blast furnaces and steel works, near Swausea; Cwmavon Iron and Steel Works, Port Talbot; the Aberbridan Colliery, near Port Talbot; and the Primitiva iron ore mine, Bilbao, and Monges iron ore mine, Lisbon; the Bryn Navigation Colliery Co., Ltd., near Port Talbot; Alfred Baldwin & Co., Ltd., of Panteg; and Pontypool Steel Works and Sheet and Galvanizing Works; the Blackwall Galvanized Iron Co., Ltd. The directors of the new company will be Messrs. Alfred Baldwin, M. P., Roger Beck, John Roper Wright, Isaac Butler, Stanley Baldwin, and Samuel Lammas Dore. The present tendency of commercial policy is undoubtedly to concentrate the whole of the various processes of manufacture as far as possible under one control. This appears to be the object of the latest combination, which will control the manufacture of tin sheets and plates and of galvanized sheets from the iron ore to the finished product, and which is even able to provide its own fuel. Following the policy adopted in recent combinations of this kind the management of the amalgamated companies will remain in the hands of those who have built up the respective businesses thus brought together. The new company will probably be registered under the name of Baldwins, Ltd.

The American Tin Plate Co. is now endeavoring to enter into an agreement with the Tin Workers' International Protective Association, similar to that made with the Amalgamated Association, which will insure the operation of the company's plants from July 15, 1902, to July 15, 1903. The tin house workers' lodges have been requested to vote upon the proposition presented to them.

INDIANA GAS SUPPLY NEAR THE END.

J. C. Leach, of Kokomo, Ind., state natural gas inspector, advises residents in the Indiana gas belt to lay in a supply of wood and coal for next winter. The natural gas companies at Indianapolis and Muncie have given notice that they will not supply gas next winter unless allowed to put in meters and charge at the rate of 25 cents a thousand. It is the opinion of the state gas inspector and other experts, who are continually going over the field, that the drain on the Indiana natural gas reservoir during the winter that is just ending has so exhausted the supply that other fuels will have to be used next winter to carry consumers over the cold days, and that the meters will afford little or no relief. In Anderson, Marion, Kokomo, Muncie, Elwood and Alexandria, which are directly over the source of supply, all of the large factories, except the glass concerns, have already taken out their gas burners and are burning coal in their furnaces. Most of the mills of the American Tin Plate Co. and American Sheet Steel Co. abandoned the natural gas altogether the past winter. In Elwood, the city that became famous as "the buckle of the gas belt," and in Alexandria, "the hub of the gas belt," gas connections have been taken out of even the city buildings and all schoolhouses are heated with coal. Practically the same condition exists in all of the other cities of the gas belt. At Frankton, the town situated on the very apex of the natural gas reservoir, the municipal electric light and water plant is being operated with coal and the gas connections have been permanently severed. A number of small manufacturing concerns, principally glass factories, will leave the state this summer on account of the failure of gas. They will be attracted to other points by the offer of bonuses.

Mr. Leach announces that there is no virgin gas territory left in Indiana, and that there is not an inch of territory that has not been drawn on as strongly as 50 pumping stations could drain during the past winter. In his opinion, an increase of wells will not afford any relief. Salt water and oil—and plenty of oil—is showing up everywhere, and the gas that does come up now produces a smoke that tells of the presence of oil. It is 12 years since natural gas became a considerable factor in Indiana. The largest industrial development based on gas was in 1891 and 1892.

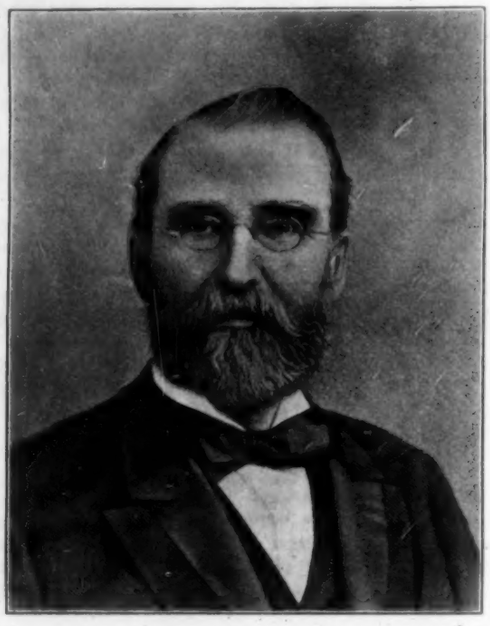
The Wheeling Roofing & Cornice Co.'s plant at New Martinsville, W. Va., is being pushed to completion. It will be equipped with the most modern appliances in all departments. The conductor pipe plant will have a capacity of 200,000 feet a day of round, square, octagon, triangular or twisted pipe. This pipe will have a patent joint which holds the lengths securely together. The eave troughs are also made by a patented process by which the trough is made free of twist. The plant makes a lap and slip joint, also a patent which gives an air tight joint without solder. Capacity 300,000 a day. The corrugating plant is being made from the company's plans and drawings and will be the heaviest ever made, corrugating No. 10 plates or a whole bundle of No. 28 gauge sheets at one pass through the machine. The continuous tin roofing will be made by improved machinery by which the sheets are folded, seams locked and soldered and painted automatically. The galvanizing plant will have the latest improvements. The sheets will be patent leveled, the sides parallel and perfectly square with the ends. The tinning plant will be a new departure in this line, the plant being delivered to the sorter automatically after it leaves the dipper. The ends and sides will be perfect right angles and the sheets being trimmed before tinning there will be no uncoated edges. They are also cleaned by a new process which leaves them clean and free from all grease. The whole plant is arranged to run without overhead belts, this allowing a clear space for the cranes. The power plant is so arranged that each department or set of machines can be worked independent of the other. The facilities for loading are ample, there being 15,000 feet of covered railroad siding. The arrangements for the workmen are complete, including wash rooms, reading and dining rooms.

The Central Machine Co. at Niagara Falls, N. Y., has purchased the plant of the Niagara Brass & Foundry Co. at the same place and will operate it hereafter.

OBITUARY.

Thomas Penrose, secretary, treasurer and manager of the Central Plow Steel Co., Ltd., of Pittsburg, died at his home at the latter place on Tuesday, March 18. He was born in Salineville, O., in 1842, and went to Pittsburg nearly 30 years ago. He was connected with Howe, Brown & Co. for many years, later becoming their Chicago representative.

Aaron French, founder of the A. French Spring Co., of Pittsburg, and president of the recently incorporated Steel Spring Co. of America, passed away at his home in Pittsburg Monday, March 24. While on a trip through the South several weeks ago he was stricken with the malady which proved fatal. He was born at Wadsworth, Medina Co., O., in 1824. His earliest occupation was that of blacksmith's apprentice, when he was thirteen years old. He followed this trade for a few years, and then became an employe of the Ohio Stage Co., at Cleveland, with which he remained for two years. He was engaged later as agent in the West for the American Fur Co. During this time he was studying to make up for the lack of early education, and at the age of twenty he attended the McGregor Academy at Wadsworth, O. He left the academy in the fall



AARON FRENCH.

of 1844 to vote for Henry Clay, and after the election went South. The next year he was engaged in the manufacture of wagons, with Peter Young, at Carlyle, Clinton Co., Ill. At this time a serious attack of illness compelled his retirement from business, his constitution being so depleted that the following four years were spent in inactivity. On his recovery he entered the employ of the Cleveland, Columbus & Lake Shore Railroad Co., at Cleveland, O. His first work with this road was the erection of the iron work of the Painesville bridge. He was with this company until 1854, when he went to Norwalk, O., and worked in a blacksmith shop. The following year he was placed in charge of the shop of the Cleveland & Pittsburg Railroad, at Wellsville, which he left to accept the superintendency of the Racine & Mississippi Railroad shops, at Racine, Wis., part of which time he also acted as master mechanic.

At the outbreak of the war he promptly offered his services, but was unable to pass a physical examination. In 1862 he was elected sheriff of Racine County. Before the expiration of his term, which lasted two years, he started in the manufacture of car springs at Pittsburg, with Calvin Wells as partner, using the firm name which is today so widely known, the A. French Spring Co.

A meeting of the foundrymen of Newark, N. J., was held on March 19 to organize a local association. Fourteen were present and it was decided to form such an association. A meeting was appointed for this week for the adoption of a constitution and by-laws.

TRADE PUBLICATIONS.

The story of human progress is outlined in the publication prepared by the Goheen Mfg. Co., Canton, O. This company is the manufacturer of a carbonizing coating for the protection of iron and steel from rust and corrosion, and the pamphlet is profusely illustrated with halftones showing the contrast between the oldtime office and the present sky-scraper construction, the wooden inn and the modern steel-frame hostelry, etc.

The Franklin Machine Works, Inc., Philadelphia, have issued a circular descriptive of their horizontal, floor boring, milling and drilling machine. This is built in several sizes and covers an unusually wide range and a great variety of work.

Bulletin No. 3 has been prepared by the Electric Controller & Supply Co., Cleveland. This publication has special reference to the "U" type of controller for the operation of standard cranes and similar service where overloads are not excessive. This line has now been on the market for over a year with very gratifying results and the features of their construction are detailed at length with many excellent halftones and engravings. These controllers are smaller and more compact than the Dinkey ventilated apparatus, which was necessarily of generous proportions to meet the heavy overloads and rough usage of rolling mill work.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of their Wants:—

The Forsythe Pattern Co., Youngstown, O., has purchased the buildings and site of the Youngstown Specialty Manufacturing Co. and will immediately equip the buildings with wood working machinery for the operation of a most modern pattern shop. The deal, in addition to including a site of two acres, includes a main building 350x56 feet. The Forsythe Pattern Co. is to be incorporated under the laws of the state of Delaware with $100,000 capital.

The Sarvent Marine Engine Co., Chicago, Ill., has been incorporated with $10,000 capital to manufacture engines and machinery. J. G. Sarvent, James Gardiner and H. P. Simonton are the incorporators.

The Hodge Bros. Co., Pasadena, Cal., has been incorporated with $25,000 capital for the purpose of operating a machine shop. Nathaniel Hodge, Arthur Hodge, J. G. Lovell, L. Perrin and C. J. Willett are the incorporators.

The National Iron Co., of Gettysburg, Pa., has been incorporated with $125,000 capital. C. A. Trostel, G. C. Landis and W. M. Hope are the incorporators.

The Cline Steam Boiler & Water Heater Co., Brookings, S. D., has been incorporated with $100,000 capital. David C. Cline, G. F. McRae and T. P. Estes are the incorporators.

F. Ferguson & Son, of Hoboken, N. J., have been incorporated with a capital stock of $50,000. The incorporators are: Fergus M. Ferguson, John Ferguson, Margaret Ferguson and Janet Ferguson.

The West Virginia Bridge & Construction Co., formed by Pittsburg and Wheeling interests, to locate works near Wheeling, W. Va., at a meeting of its directors has elected the following officers: Edward Hazlett, president; George A. Laughlin, vice-president; G. E. Wincher, secretary and treasurer; and J. H. Bartlett, general manager. The plant is to cost about $500,000 and will be enlarged later. Mr. Barrett, the general manager, was formerly connected with the Keystone Bridge Co. and the Columbia Bridge Co.

The Cedar Rapids Foundry & Machine Co., Cedar Rapids, Ia., has been incorporated; capital, $25,000; Joseph Cookfield, president and treasurer; D. B. Getty, vice-president and secretary.

The Advance Machine Co., Los Angeles, Cal., has filed articles of incorporation. The directors are Edward M. Buckins, J. E. A. Buckins, Frank L. Gates, E. F. Gates and W. Homer Kennedy. The capital stock is $50,000.

The Boston Steel & Iron Co. has been incorporated in New Jersey with a capital stock of $1,000,000. The incorporators are E. M. Mabie, George F. Maguire, Edward R. Dean, and

Herbert D. Cohen, of New York, and Nathan F. Griffin, of Newark, N. J. This company is formed to take over the business of the company of the same name with a capital of $100,000, located at Medford, Mass. The specialty of the Boston Steel & Iron Co. is architectural steel. The company owns valuable property in South Boston and at Medford, Mass.

The Melius-Steele Machine Co., of Gloversville, N. Y., has received a charter of incorporation. Capital stock, $5,000. The directors are: G. H. Melius, W. F. Steele and C. C. Kelly, of Gloversville.

The Keystone Foundry & Mfg. Co., of McKeesport, Pa., manufacturers of stoves, has been reorganized and the plant will be enlarged. George Turner has been chosen president and A. M. Risher secretary and treasurer. Harry Monath will be the general manager.

The Lacy-Buek Iron Co. of Chattanooga, Tenn., has been incorporated with $300,000 capital to develop iron ore tracts in Northern Alabama and in Tennessee.

The Eclipse Machine Molding Co. and the Eclipse Steam Pump Co., of Beloit, Wis., were incorporated last week by G. W. Sparks, Osborne Sampson and P. C. Brooks. The first named company is capitalized at $100,000 and the second at $25,000. The one company will manufacture molding machines and the other will manufacture and deal in pumps and air compressors.

The Portsmouth Pressed Steel Co., of Portsmouth, O., has been incorporated with $100,000 capital for the purpose of operating a plant to manufacture pressed steel articles. A. E. Manchester, R. C. Ricker, J. W. Ricker, F. L. Baldwin and S. M. Johnson are the incorporators.

The abandoned plant of the American Tin Plate Co. at Cumberland, Md., has been purchased by the recently incorporated Maryland Rail Co., which has a capitalization of $50,000. Contracts have already been let for the installation of mills for rolling light rails from 12 to 40 pounds. Heavier sections will be rerolled. The incorporators are H. H. Dickey, A. F. Baumgarten, H. E. Weber, N. A. Taylor and W. C. Dickey. H. H. Dickey has been elected president; A. F. Baumgarten, vice-president; William C. Dickey, secretary, and H. E. Weber, treasurer.

The Marietta Sheet & Tin Plate Co., of Marietta, O., has been incorporated with $200,000 capital under the laws of West Virginia. An organization will shortly be perfected and the work of erecting the plant will be commenced.

The Old Colony Foundry Co., of East Bridgewater, Mass., has been incorporated with $12,000 capital. I. N. Nutter, R. W. Nutter and Edward Hobart are the incorporators.

The Eureka Steel Range Co., of O'Fallen, Ill., has been incorporated with $5,000 capital to manufacture stoves and ranges by W. G. Willard, A. A. Willard and W. G. Willard, Jr.

Jones-Kastenhuber Mfg. Co., Houston, Texas, has been incorporated with a capital of $25,000 by F. A. Jones, F. C. Jones and Edgar Watkins.

The Birmingham Iron & Supply Co., Birmingham, Ala., has reorganized and increased its capital stock.

Noel E. Turner, president Alabama & Mississippi Railroad Co., Vinegar Bend, Ala., wants bids on complete equipment for foundry and machine shop.

The Santa Fe Railroad is reported in the market for 300 machine tools of different kinds.

The Matthews Foundry & Machine Co., Hartford City, Ind., has been incorporated with a capital stock of $5,000, by E. B. Bohr and R. F. Crick. The company will erect two buildings, one 30x70, and the other 30x30.

W. J. Loth Stove Co., Waynesboro, Va., is in the market for a blower to run 70-inch cupola, and for 80-horsepower boiler and 60-horsepower engine, either new or second hand.

The Juniata Tube Co., of Lewiston, Pa., has been incorporated with $800,000 capital, half of which is preferred and the remainder common stock. A site for the plant has been secured at Burnham, Pa., which is about four miles from Lewiston, adjoining the plant of the Logan Iron & Steel Co. The officers of the company are: E. H. Weeks, Philadelphia, president; J. I. Quigley, Lewistown, vice-president; H. J. Fosnot, Lewistown, secretary and treasurer; directors, E. H. Weeks, William Maguire, Alexander L. Francois, A. J. Rote, Gardiner W. Kimble, Edgar G. Webb, J. I. Quigley, H. J. Fosnot, J. M. Goodhart and William F. Eckbert, Jr.; executive committee, E. H. Weeks, William F. Eckbert, Jr., and H. J. Fosnot. The main office will be in Lewiston, the factory at Burnham and the foreign office in Philadelphia.

Meier Dental Mfg. Co., St. Louis, is reported as desiring prices on light malleable and gray iron castings.

Ouachita Cotton Mills, Monroe, La., desires prices on a lathe, 16-inch swing; 24-inch drill press, and a gear cutter.

R. E. Grant, Middleport, O., is in the market for a Corliss engine, 20x48, new or second-hand.

W. Frazier, care Chesapeake & Ohio Railway, Ronceverte, W. Va., wants a second-hand compressor of sufficient capacity to run four or six quarry drills, No. 3½.

New Construction:—

J. Bralosky, of Cleveland, has purchased about ten acres of land, at a cost of $24,000, for a scrap iron yard and will have several buildings.

An appropriation of $28,000 has been allowed by the Kentucky legislature for the erection of a foundry at the Frankfort penitentiary.

The American Car & Foundry Co. will build a steel car plant at Berwick, Pa., to have a capacity of ten to twenty cars a day. The main building will be 730x185 feet.

The Atlantic & Birmingham Railroad Co., George Dole Wadley, vice-president, will build large car shops at Waycross, Fla.

The Southern Car & Foundry Co. is said to be considering the erection of a large malleable iron foundry 75x80 feet, at Anniston, Ala.

Ground has been broken for a foundry at Pueblo, Col. The building will be 160x300 feet.

The Defiance Machine Works, of Defiance, O., will build a warehouse, 66x132 feet, at a cost of $7,000.

The Dimmock Pipe Co., Birmingham, Ala., is enlarging and improving its foundry at a cost of $25,000.

The Santa Fe Railroad is to expend about $250,000 on the shops and yards at San Bernardino, Cal.

The new plant of the Longtine Gas Engine Co., at Williamsport, Pa., is in running order and the company will build an addition for a pattern shop and erecting room.

The American Car & Foundry Co. will build a blacksmith shop, 80x140 feet, at St. Charles, Mo., and make other improvements.

Ground has been broken at Alliance, O., for the plant of the Alliance Machine Co.

The Convertible Car Co., of New York, may locate a plant at Somerset, Pa., for the manufacture of street cars if local capitalists accept the company's terms.

The Union Pacific shops at Omaha, Neb., are under construction, the foundation for the machine shop, 150x400 feet, completed; the pattern shop will be 50x200 feet.

The Haskell & Barker Car Co., of Michigan City, Ind., is enlarging its plant.

Contracts have been awarded for the erection of the Kenney machine shops at Scottdale, Pa. The main structure will be 340x110 feet, with an office building 25x42 feet, two stories high. The buildings will be completed in June or July.

The Hilles & Jones Co. will erect a $9,000 pattern shop at Wilmington, Del.

The plant of the American Bridge Co. at Minneapolis, Minn., formerly the Gillette-Herzog Mfg. Co., is to be enlarged to two or three times its present capacity.

The George White Buggy Co., Rock Island, Ill., will remove its plant to Clinton, Ia., this summer. A three-story brick building, 150x80 feet, will be erected. The capital stock of the company will be increased.

The Clyde Iron Works, Duluth, Minn., has had plans prepared for extensive additions to its plant. The company proposes to build two buildings, one 40x195 feet, three stories high, and the other 40x195 feet, one story high.

It is reported the Normal Novelty Works, Bloomington, is figuring on a malleable iron plant.

The Hoopestown Horsenail Co., Hoopestown, Ill., will erect an addition to its plant 176 feet in length.

The Elmira Rolling Mill Co., Elmira, N. Y., has been incorporated with a capital stock of $100,000. The company is building a new plant that will be equipped with a 10, 14 and 18-inch train. The plant will have an annual capacity of 15,000 tons of refined bar iron. The officers are E. E.

Buchanan, president; I. D. Booth, vice-president; N. D. Doxey, secretary, treasurer and general manager.

It has been announced that the Youngstown Mfg. Co., Youngstown, O., will install a rolling mill in the very near future. S. B. E. McVay has been engaged as manager.

H. Disston & Sons, Philadelphia, Pa., will erect a new rolling mill 200x100 feet and a hammer shop 60x100 feet.

The Philadelphia Forge Co. will erect a machine shop at Tacony, Pa. It will measure 30x60 feet.

The Lookout Boiler Co., Chattanooga, Tenn., will erect a new boiler shop building at a cost of $3,000.

The Columbus Bolt Works, Columbus, O., will erect a four-story warehouse and office building adjoining its present plant.

The Jeansville Iron Works Co., Jeansville, Pa., has decided to make extensive improvements. Plans are now being prepared and they include a new foundry, three-story pattern shop, large addition to the machine shop and a three-story office building.

The Ohio Falls Iron Co., New Albany, Ind., has commenced the erection of its new much mill which will be 300 feet long and 275 feet wide.

The Commonwealth Steel Co., of St. Louis, has let contracts for the equipment of its open-hearth steel foundry plant. The buildings will be erected by the Fort Pitt Bridge Co., of Pittsburg, under a time limit clause calling for completion in September. They will consist of a main structure, 500 feet long by 80 feet in the clear in width; two 400-foot buildings, each 60 feet wide; molding bay, 500 feet by 40 feet; furnace bay, 500 feet by 65 feet—all of steel construction and covered with corrugated iron. The crane equipment will be of the Whiting make, embracing two 35-ton and four 5-ton cranes, and the electrical installation will be from the Westinghouse works. For the power plant Stirling boilers and Fulton Iron Works engines of St. Louis have been selected.

The Moline Plow Co., Moline, Ill., has begun work on an addition which will cost about $50,000. It is to be of brick, 300 feet long, 30 feet wide at one end, and 70 feet wide at the other. Part of the building will be four stories high, the rest six.

Voss Bros. Mfg. Co., Davenport, Ia., will triple the capacity of its works by the erection of a two-story building, 64x150 feet. An 80-horsepower engine, new boilers and other machinery will be installed.

The LaCrosse Plow Co., LaCrosse, Wis., will enlarge its plant by the addition of a factory building, 60x150, five stories high, to be devoted to the manufacture of seeders and drills; an addition to the foundry, increasing the capacity 40 per cent; a new stock house, 100x140, one story and basement; a lumber shed, 60x180; and a new steam plant, including a 250-horsepower boiler.

The Texas & Pacific Railway Co. will erect a boiler shop 150x100, at Marshall, Texas. L. S. Thorne, general manager, Dallas, Texas, is the party to address.

The Virginia Bridge & Iron Co., Roanoke, Va., has the contract for the construction of the plant of the Knoxville Iron Co., Knoxville, Tenn. There will be three buildings of steel construction, 396x80, 240x74 and 240x60 feet, and will cost $500,000.

Fires and Accidents:—

The plant of the Noble & Johnston Machinery Co., Hoosick Falls, N. Y., was completely destroyed by fire last week. The plant consisted of a large pattern shop, machine shop and foundry. The loss is estimated at $60,000.

Fire damaged the plant of the Crescent Iron Works, Elizabeth, N. J., to the extent of $10,000 on Tuesday, March 18.

The machine shops of the union Traction Co., Anderson, Ind., were destroyed by fire March 16. The company is having plans made for a new machine shop to cost $300,000.

The Lowville Iron Works, Lowville, N. Y., were burned to the ground March 19. The loss was $6,000; insurance, $3,500.

The pattern shop and engine room of the J. G. Wagner Co.'s plant at Milwaukee, Wis., was destroyed by fire, March 20. Estimated loss, $4,000.

The Pittsburg District:—

The Riter-Conley Mfg. Co., of Pittsburg, has been awarded the contract for the erection of the buildings of the recently incorporated Sharon Foundry Co., of Sharon, Pa. The main building will be 450 feet long and 130 feet wide and will be constructed of steel and brick. There will be a number of auxiliary buildings.

The structural plant of the McClintic-Marshall Construction Co., Rankin, Pa., which was forced to suspend operations last week on account of the scarcity of material, resumed this week.

Frank C. Roberts, the well-known engineer of Philadelphia, Pa., had representatives in Pittsburg last week for the purpose of securing mechanical engineers to go to England to assist in the work of remodeling 11 furnaces, contracts for which have already been closed.

A number of Homestead and McKeesport, Pa., citizens have purchased the McKeesport foundry at Versailles, Pa., and have organized the Keystone Foundry & Mfg. Co. to operate it. The new company has $50,000 capital. H. A. Monath, of Homestead, is president and M. F. Risher, secretary and treasurer. The plant will be enlarged for the manufacture of stoves and ranges.

The Pittsburg Wire & Tool Steel Co., of Pittsburg, will be incorporated shortly by Godfrey Stengel, Werner Kaufman and others for the purpose of erecting a plant at Monaca adjoining the works of the Colonial Steel Co. The output will consist of wire and tool steel products.

One of the largest shipments of armor plate ever made went from the Homestead works of the Carnegie Steel Co. last week, when 36 plates for Russian battleships building at Kronstadt were shipped. In addition to the heavy plates there were 35 tons of case made taper plates and a large number of bolts for fastening the armor.

Arrangements are now being made by Charles T. Schoen for the erection of an experimental plant at the plant of the Bethlehem Steel Co., South Bethlehem, Pa., for the manufacture of rolled steel car wheels.

The Pittsburg Reduction Co. is preparing plans for the erection of an aluminum wire plant near East St. Louis, Mo. A similar plant is now in operation at New Kensington, Pa.

The McKees Rocks Mfg. & Foundry Co., McKees Rocks, Pa., which recently purchased a site for $30,000 at McKees Rocks, will shortly award contracts for the erection of the buildings for its plant. The main building will be 60x200 feet.

The new Talbot open-hearth furnace of Jones & Laughlins, Ltd., will be started on April 15.

The Fischer Foundry & Machine Co., South Side, Pittsburg, is preparing to erect an extensive plant for the manufacture of steam engines near Connellsville, Pa. The Pittsburg plant of the company will not be abandoned; it is now being greatly enlarged.

General Industrial Notes:—

The Havana Bridge Works, Montour Falls, N. Y., who recently sold the portion of their plant and business devoted to the manufacture of bridge and structural work to the Rochester Bridge & Construction Co., Rochester, N. Y., will confine their operations hereafter to the manufacture of pneumatic tools. Their plans are not fully perfected, but it is the expectation to build a plant in the near future. The manufacture of pneumatic tools will be carried on under the management of J. A. Shepard, vice-president.

The American Hardware Corporation, in which were recently merged the P. & F. Corbin Co., of New Britain, Conn., and the Russell & Erwin Mfg. Co., has elected the following officers: President, Philip Corbin; first vice-president, Charles M. Jarvis; second vice-president, George J. Laighton; treasurer, A. J. Sloper; assistant treasurer, Charles E. Wetmore; secretary, Theodore E. Smith. The directors are: Philip Corbin, Andrew Corbin, Charles M. Jarvis, Charles H. Parsons, Charles Glover, George J. Laighton, Andrew J. Sloper, Howard S. Hart and William G. Smythe.

The American Steel & Stamping Co., of Lorain, O., is negotiating with the board of trade of Danville, Ill., with reference to securing a site and bonus for the removal of its plant.

The rolling mill and steel plant of the American Rolling Mill Co. at Muskegon, Mich., will shortly be placed in operation again. When the black plate mills of the plant were purchased by the American Tin Plate Co. the steel plant and bar mills were shut down. D. Morgan, superintendent of the tin plate plant, is reported to have secured the majority of the stock and will proceed to place the plant in operation.

INDUSTRIAL BETTERMENT EXHIBITS AT ST. LOUIS.

The Department of Social Economy of the Louisiana Purchase Exposition has announced that that portion of the exposition is to be organized on comprehensive lines. The social economy classification for St. Louis includes industrial as well as social or reform institutions, and in this respect is a radical departure from the French classification of 1900. The idea upon which the exhibit will be developed is to present from each country, (1) a complete survey of its natural resources, (2) its industrial organization and, (3) its social problems or efforts for improvement of conditions. The aim of the department in the preparation of exhibits will be to instruct, and to secure this result the general classification will be divided into four sections, viz., social economy proper, groups 129 to 138 inclusive; charities and corrections, group 139; public health, group 140; municipal improvement, group 141. Under the head of social economy proper we find the following among other groups, which will be of special interest to employers:

Group 131—State Regulation of Industry and Labor, will contain the laws made by states and governments for the regulation of industry and labor, the methods of inspection of factories and mines, labor legislation in all its branches, safety devices and means for preventing accidents, laws in reference to the employment of minors, and other matters of kindred nature.

Group 132—Organization of Industrial Workers, relates to industrial organizations of all kinds. In particular, efforts will be made to show the work of employers' associations, which has never been done before. Under this group also comes everything pertaining to the reciprocal relations between labor and capital, between employers and employes, adjustment of strikes, methods of arbitration, etc.

Group 133—Methods of Industrial Remuneration, will contain exhibits showing all the different systems for sharing the products of industry; different forms of wage systems, profit sharing, and industrial cooperation and copartnership.

Group 136—Housing of the Working Classes, will include the various building and sanitary regulations in force in different states and cities, and the erection of improved dwellings either by employers, by private effort, or by public authority. The widespread interest at the present time in the better housing of the industrial classes offers the opportunity to make the exhibit in this group of special interest.

Group 138—General Betterment Movements, will include those general organizations and institutions organized for the benefit of employes, and for the establishment of centers of wholesome social activity, and the creation of intelligent public opinion. Within this field would come social settlements maintained under private or public auspices, the work of humane societies, and institutional work, church or other. This group will include in general all movements not otherwise classified for improving social and industrial conditions and raising the general standard of community life.

The strike of machinists at the plant of the Morgan Engineering Co., Alliance, O., is growing serious as the strikers last week used threats and violence to prevent the new men engaged to take their places from entering the plant by violence. The Morgan Engineering Co. secured a temporary restraining order at Canton, O., preventing the strikers from interfering with the employment of non-union men.

British Makers of Iron and Steel Alloys.

The firm of Geo. G. Blackwell, Sons & Co., Ltd., of Liverpool, is the subject of an article in a recent issue of the London *Iron and Coal Trades Review* dealing with its part in the development of the British export trade in iron and steel alloys. The firm was founded in 1869 by Geo. G. Blackwell, whose visits to the United States have made him familiar with the conditions of steel manufacture here and have familiarized the American steel trade with his products. The principal mineral which has been developed by Mr. Blackwell is manganese ore. His connection with the trade dates back more than 45 years when Devonshire was the chief source of supply. Discoveries were made in Germany, then in Spain and Portugal, and about 30 years ago deposits in Canada, Virginia, Georgia and other parts of this continent became prominent. The Russian deposits came later, their shipments now reaching 250,000 tons a year. The varied uses of manganese in steel manufacture have been forwarded by the Blackwell firm in various ways. With the development of the basic steel process the Messrs. Blackwell have introduced a highly refractory lining and neutral material—chrome ore, which is now in use in England, the United States and on the Continent. They have also introduced ferro-chromium in the manufacture of armor plate. Special alloys for steels are manufactured, including those of the rarer metals—tungsten, molybdenum, titanium, uranium and vanadium. Extensive bauxite deposits in Ireland have been opened up, and the same firm has been prominently connected with the trade in French chalk, mica, barytes, plumbago, fluorspar, felspar, pumice stone, fullers earth, antimony, ochres, oxides of iron, wolfram, scheelite, etc.

STEVENSON MINE, MESABI RANGE, FROM WHICH 1,500,000 TONS OF IRON ORE WILL BE TAKEN IN 1902.

A Hint of Reaction.

Some significance must perforce be attached to the latest figures recording railroad construction in this country. Construction work in that field of industry is slackening, apparently. Investigations by the *Railroad Gazette* disclose 1,308 definite railway-construction projects now under way in the United States, against 1,689 in October last, and 1,700 in March, 1901. The number of companies in whose interests these projects are proposed aggregates now 995, against 1,038 in October and 1,290 a year ago. Revised figures of railroad construction for 1901 show 5,368 miles of track actually completed; Texas, with 537 miles of new railroad, and Oklahoma, with 429, reporting considerably over twice as much as any other state or territory. In each of seven states—Georgia, Iowa, Michigan, Minnesota, Missouri, New Mexico and Wisconsin—over 200 miles were built. The difference in construction conditions between March of 1901 and the present month comprehends 392 projects—a falling off of 23 per cent; and the number of companies with track-extension work in progress is now 295 less than it was in March, a year ago—a lessening of considerably more than 22 per cent.—[New York Commercial.

AN OPINION ON THE PIG IRON PRODUCT.

Rogers, Brown & Co., of Cincinnati, comment as follows on the pig iron market: "There have been rumors, apparently well authenticated, that the Southern interests, who have been endeavoring to keep down prices to the basis of $12.00, Birmingham, for No. 2 foundry, have seen the hopelessness of their task and are now about to make an advance of $2 to $3 per ton. This, however, has been strenuously denied by their representatives. It evidently matters little, however, to the consumer, for, as a rule, they are more interested in what they have to pay for iron to be melted during the next six or eight months than the nominal price at which it can be purchased for delivery during the last quarter. Most buyers are of the opinion that it is beyond the power of any set of producers to keep prices either up or down when they try to do so contrary to the law of supply and demand. The business of the country is too great to be controlled by any combination of producers now in existence. A prominent Eastern foundry company writes that its chairman for thirty years past has never once purchased his iron at the wrong time or failed to purchase it at the right time, but now, in consequence of assurance received from some of the parties controlling Southern furnaces, that there would be no advance in pig iron, it seems that their thirty years' record has been broken. There is a decided scarcity of strong low phosphorus iron, suitable for car wheels and work of that character. Everything in the way of Bessemer, off Bessemer and malleable grades is being eagerly sought and the question of price apparently enters but little into consideration. During the week some large sales of malleable iron have been made at advanced prices."

Senator Hanna has named the members of the committee on conciliation of the National Civic Federation, whose appointment was provided for at the last meeting of the executive committee. According to the by-laws the committee was to consist of the officers of the executive committee, M. A. Hanna, chairman; Samuel Gompers, first vice-chairman; Oscar S. Straus, second vice-chairman; Charles A. Moore, treasurer, and Ralph M. Easly, secretary, and nine men to be appointed by the chairman. His appointments are: Archbishop Ireland, Bishop Potter, Franklin McVeagh, John Mitchell, Frank F. Sargent, James Duncan, J. Kruttschnitt, William H. Pfahler, and Marcus M. Marks. This committee is to take up threatened troubles between capitalists and workingmen with a view to settling them.

A meeting of the directors of the Nova Scotia Steel Co. was held at Montreal recently, at which the following statement was made: The profits for the year 1901 were $508,936.79. Balance at the credit of the profit and loss account, Dec. 31, $242,030.24; total, $750,967.03, which has been disposed of as follows: Interest on bonds, $93,237.84; eight per cent dividend on profit shares, to Dec. 31, 1901, $82,430; four per cent dividend on common shares, to Dec. 31, 1901, $123,600; reserve fund for depreciation, renewals, etc., $100,000; balance at credit of profit and loss, carried forward, $351,729.19.

The Elmira Rolling Mill Co., Elmira, N. Y., recently incorporated with a capital stock of $100,000, is building a new mill which will be equipped with a 10, 14 and 18-inch train, four Cahall waste heat boilers of 200 horsepower each, two 350 horsepower engines and will have an annual capacity of from 12,000 to 15,000 tons of refined bar iron All the equipment except the engines, which have not yet been secured, has been purchased through David Townsend, of Philadelphia. The officers are: E. E. Buchanan, president; Irving D. Booth, vice-president, and N. D. Doxey, secretary, treasurer and general manager. Other Elmira capitalists interested include M. H. Arnot, James B. Rathbone, John Brand, L. R. Johnston, E. G. Herendeen, Dr. Frank B. Darby, D. E. Rice and Jud H. Johnson. The mill will start about June 15 and will employ 100 hands.

C. O. Bartlett & Co., of Cleveland, have been incorporated under the name of the C. O. Bartlett & Snow Co. A tract of land has been purchased with buildings and power plant, consisting of a 150 h. p. boiler and engine. This property comprises 16 lots, or one entire block, situated in the central part of Cleveland with excellent railroad facilities. Other buildings will be added and it is the intention of the firm to have a modern plant. C. O. Bartlett will be president of the corporation and K. F. Snow vice-president and general manager.

Hardware Jobbers' Consolidation.

The movement for a consolidation of hardware jobbers in a great company with $30,000,000 capital is again on foot in earnest. Options have been taken on most of the jobbing interests in the leading cities. On the other hand a number of concerns have refused to give options, believing that the project is impracticable. It has been discussed informally in connection with the last two conventions of the National Hardware Association. Among concerns named as prominent in the promotion of the deal are the Simmons Hardware Co., of St. Louis; Supplee & Co., of Philadelphia; Hibbard, Spencer, Bartlett & Co., of Chicago, and Bigelow & Douse, of Boston.

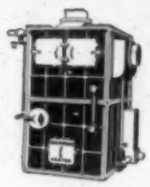
Manganese in Casting Bronze and Brass.

Occasionally we find that bronze castings crack when hammered or threaded. This is held to be a cold shortness due to too much phosphorus added in the making in order to deoxidize the metal. Manganese deoxidizes the metal also, and when added in the shape of a manganese-copper, tin, or nickel alloy is considered preferable, as an excess of it is rather an advantage, increasing the tensile strength and elongation. As only small quantities are used the question of cost is not serious. When using a 30 per cent Mn. alloy with copper, .9 to 1.0 per cent is added to yellow brass and .9 to 6.5 per cent to red brass. With a 45 per cent Mn. alloy with tin, .6 to 1.0 per cent is added to brass and .6 to 4.4 per cent to bronze. In introducing these alloys add them to the copper and melt in a crucible with some borax and cover with charcoal. In an hour the melt will be ready for the tin, and then zinc addition. Do not pour too hot. Where manganese-tin is used it is added last. Manganese-nickel will also be found valuable, and can replace manganese-copper in the mixtures given above. Manganese-nickel is also a good thing to add to pure nickel when casting nickel anodes.—[Journal of American Foundrymen's Association.

The International Steam Pump Co. is having plans prepared for new works at Harrison, N. J., where it has been decided to combine the Worthington shops, now located at Elizabethport, N. J., and Brooklyn, N. Y. As far as announced the plans provide that the numerous great buildings are to be so grouped that future extensions can be made without disturbing the general system of arrangement. The main buildings will be arranged along an L formation, so that the ends of each can be extended whenever necessary. There will be a main machine shop, 125 feet wide and 1,000 feet long, running from north to south. Running parallel with this structure and 150 feet in back of it there will be the erecting shop, 125 feet wide and 600 feet long. Both of these buildings will contain a gallery on each side of the center span. Between these buildings and connecting them is to be the high erecting shop, which will be about 120 feet high, 110 feet long and 150 feet wide. This building will be four galleries high. At the northern end of the intervening 150 feet between the machine and erecting shops there will be a bridge connecting them to a wash and locker house, 150 feet wide and 75 feet long.

Contracts have been closed for a steam turbine plant at the central power house, at Elyria, O., of the Cleveland, Elyria & Western Railway Co. The contracts call for two 1,000 k. w. Parsons turbines, to be directly connected to two 1,000 k. w. two-pole Westinghouse turbine generators, and also for two 30 k. w. direct current exciters. The officials are also about to close contracts for improved boilers, economizers, mechanical stokers and a central condenser plant of the overhead type.

The directors of the Belfont Iron Works, Ironton, O., have just declared an extra cash dividend of 10 per cent, payable April 5.



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With one pound of exhaust steam they will heat six pounds of cold water to practically the boiling point, giving you seven pounds of hot water for your boilers, where, under the same conditions, it would take (if you used a closed heater) one and one-sixth pounds of exhaust and seven pounds of cold water to get seven pounds of hot water—perhaps not so hot.

A dozen other advantages. We tell you about each of them in our catalogue "11-H." So if you are looking into the heater question, please remember to investigate the

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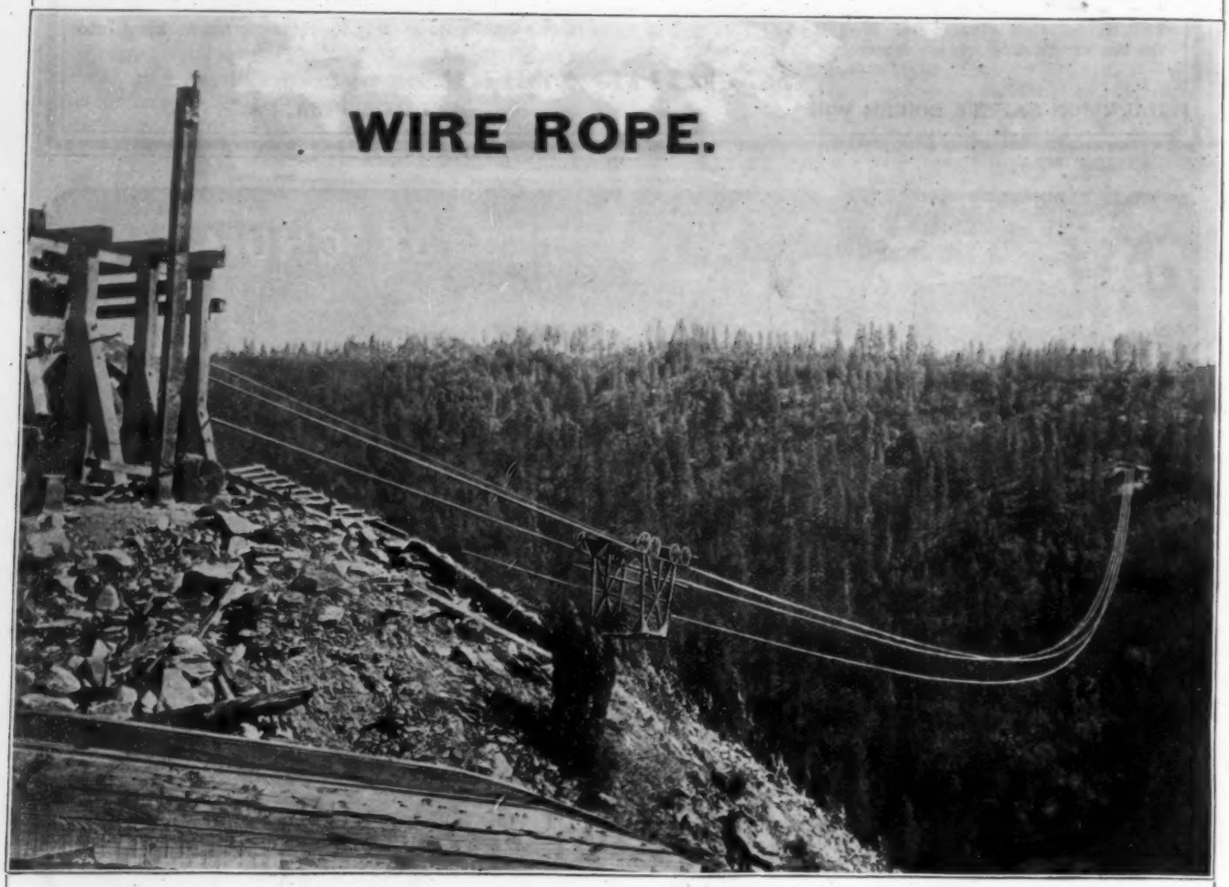

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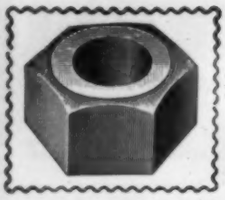

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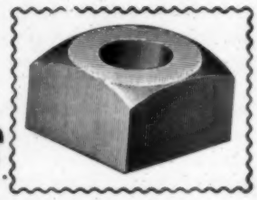

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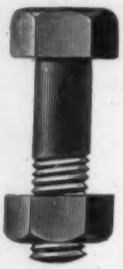

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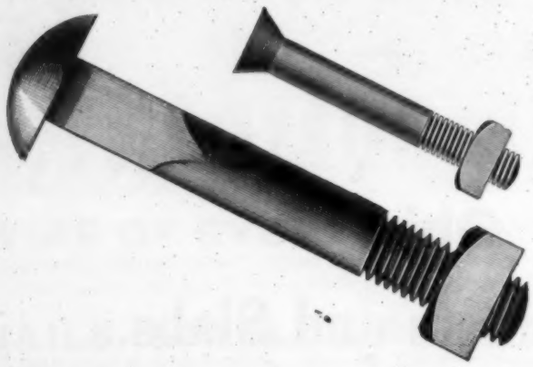

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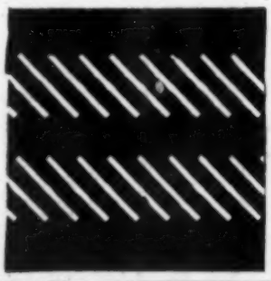

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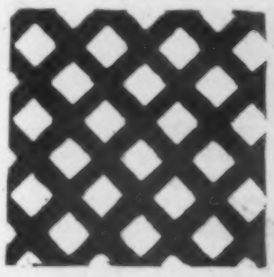

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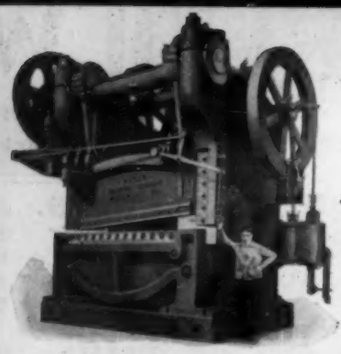

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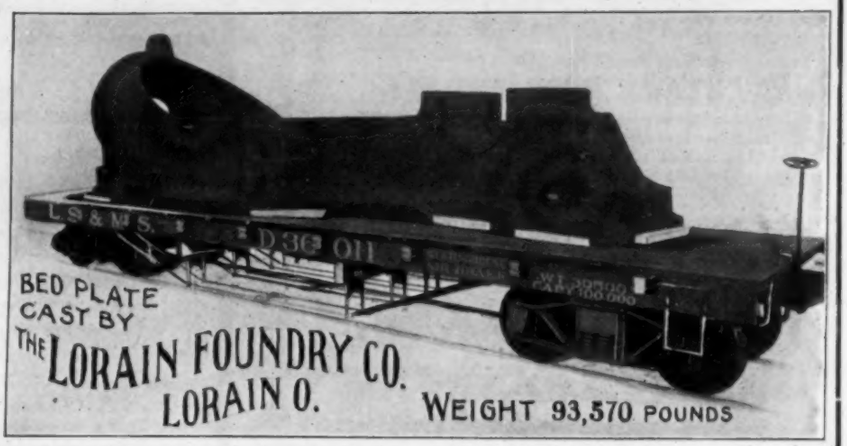

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